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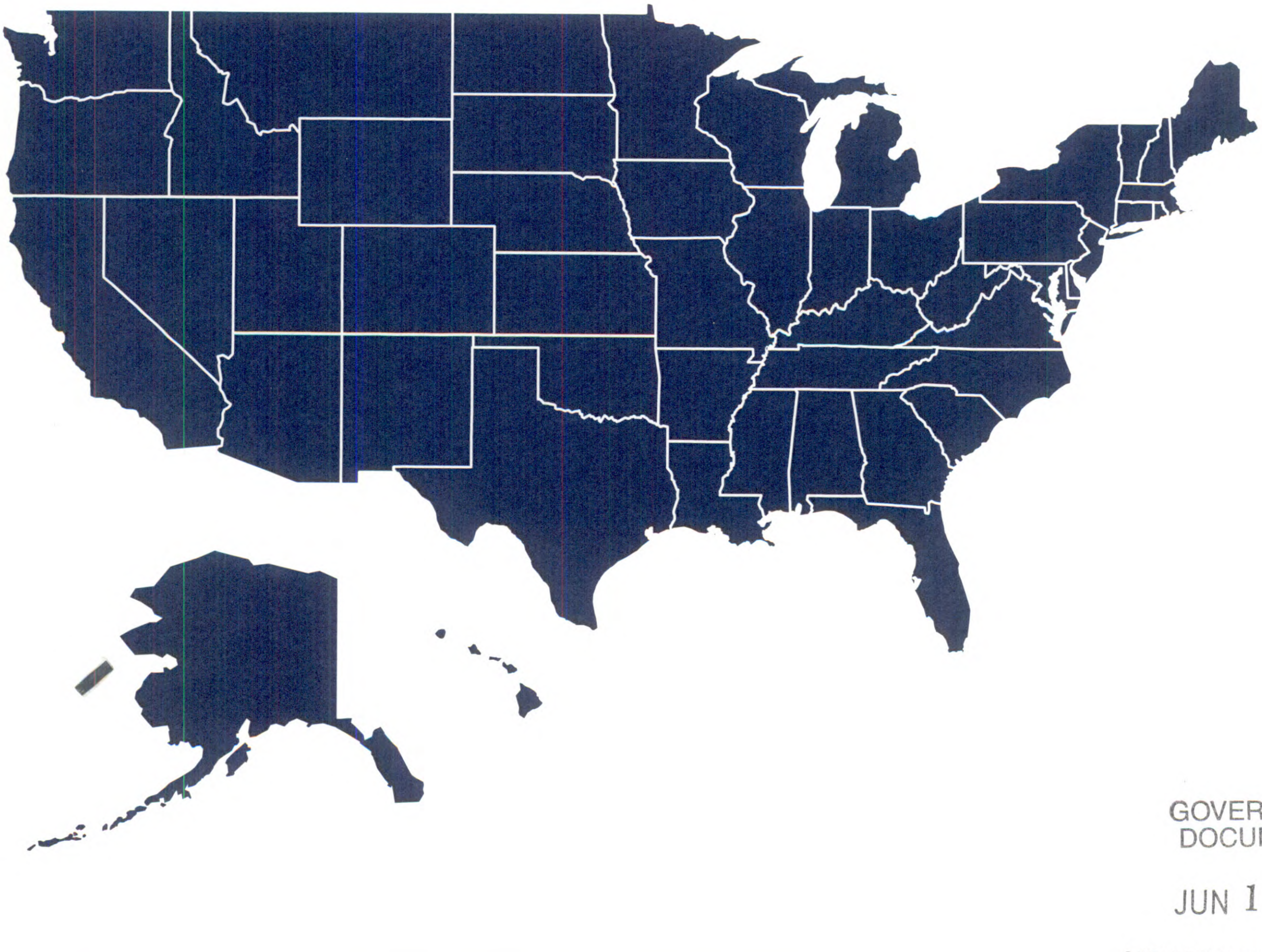
MINERALS YEARBOOK

Area Reports: Domestic 2001

Volume II



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MINERALS YEARBOOK

Area Reports: Domestic 2001

Volume II

U.S. DEPARTMENT OF THE INTERIOR
GALE A. NORTON, Secretary

U.S. GEOLOGICAL SURVEY
CHARLES G. GROAT, Director

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Foreword

This edition of the U.S. Geological Survey (USGS) Minerals Yearbook discusses the performance of the worldwide minerals and materials industry during 2001 and provides background information to assist in interpreting that performance. Content of the individual Minerals Yearbook volumes follows:

- Volume I, Metals and Minerals, contains chapters about virtually all metallic and industrial mineral commodities important to the U.S. economy. Chapters on survey methods, summary statistics for domestic nonfuel minerals, and trends in mining and quarrying in the metals and industrial mineral industries in the United States are also included.
- Volume II, Area Reports: Domestic, contains a chapter on the mineral industry of each of the 50 States and Puerto Rico and the Administered Islands. This volume also has chapters on survey methods and summary statistics of domestic nonfuel minerals.
- Volume III, Area Reports: International, is published as four separate reports. These regional reports contain the latest available minerals data on more than 170 foreign countries and discuss the importance of minerals to the economies of these nations and the United States. Each report begins with an overview of the region's mineral industries during the year. It continues with individual country chapters that examine the mining, refining, processing, and use of minerals in each country of the region and how each country's mineral industry relates to U.S. industry. Most chapters include production tables and industry structure tables, information about Government policies and programs that affect the country's mineral industry, and an outlook section.

The USGS continually strives to improve the value of its publications to users. Constructive comments and suggestions by readers of the Minerals Yearbook are welcomed.

Charles G. Groat, Director

Contacts

Information about the U.S. Geological Survey, its programs, staff, and products may be accessed on the World Wide Web at URL http://www.usgs.gov/ or by contacting the Earth Science Information Center at 1-888-ASK-USGS. For specific information about this publication, contact the Chief, Publication Services Section, Minerals Information Team, at (703) 648-7790. Additional minerals information may be accessed on the World Wide Web at URL http://minerals.usgs.gov/minerals/.

Acknowledgments

This volume was produced by Arnold O. Tanner and J. Roger Loebenstein, Physical Scientists with the Minerals Information Team of the U.S. Geological Survey (USGS). Domestic nonfuel mineral production data and tables were prepared by Stephen D. Smith, Industry Data Analyst; crushed stone data were prepared by Susan M. Copeland, Statistical Assistant; and construction sand and gravel data and tables were prepared by Cheryl J. Crawford, Statistical Assistant. All mineral commodity rankings and statistical analyses were performed by Mr. Tanner and were based on data reported to the USGS by companies responding to the annual canvasses of nonfuel mineral producers in the United States. Mineral production data and related rankings for 2001 are preliminary owing to publication of this volume before final data for all mineral commodities are made available. Data and related rankings prior to 2001 are from final tabulations. For crushed stone and construction sand and gravel, each State chapter includes tabular data by State aggregate districts, where applicable, based on final 2000 data. Compilations of data contained in this volume were largely based on statistics and other data provided by the mineral industries. The USGS gratefully acknowledges the willing contribution of these essential data by both companies and individuals. Information regarding a State's mining industry, mineral exploration, and other mining-related activities or legislation was derived from information submitted by officials from each participating State. We thank those State agencies that contributed mining and minerals industry information for their States. Their submissions significantly broadened the scope of those chapters; their participation in this joint project is greatly appreciated. Authors of text submissions from participiating States are referenced by footnote in each chapter as appropriate. All chapters underwent technical review by USGS mineral commodity specialists and other agency professionals. The melding of their knowledge and expertise into this project was invaluable in producing accurate individual documents and is greatly appreciated. Each of these State chapters was published previously as a State Annual Estimate in the USGS "Mineral Industry Surveys" series. Maps indicating "major producing areas" lead off each respective chapter; a chapter is included that lists with meanings the mineral symbols used in this volume. The State maps were updated and revised in collaboration with USGS mineral commodity specialists and State agencies.

In the collection of statistical and other mineral industry information, the USGS also was assisted by various State agencies through cooperative memoranda of understanding (MOUs). Some of the chapters in this publication were reviewed by staff members of these State agencies. Our sincere appreciation for all agency cooperation is extended to each State and Commonwealth government agency that has an MOU with the USGS. These are as follows:

Alabama: Geological Survey of Alabama.
Arizona: Arizona Department of Mines and Mineral Resources.
Arkansas: Arkansas Geological Commission.
California: California Geological Survey.
Colorado: Colorado Geological Survey.
Connecticut: Connecticut Geological and Natural History Survey.
Delaware: Delaware Geological Survey.
Florida: Florida Geological Survey.
Georgia: Georgia Geologic Survey.
Idaho: Idaho Geological Survey.
Illinois: Illinois State Geological Survey.
Indiana Indiana Geological Survey.
Iowa: Iowa Geological Survey and Land Quality Bureau.
Kansas: Kansas Geological Survey.
Kentucky: Kentucky Geological Survey.
Louisiana: Louisiana Geological Survey.
Maine: Maine Geological Survey.
Maryland: Maryland Department of the Environment, Minerals, Oil, and Gas Division.
Massachusetts: Massachusetts Executive Office of Environmental Affairs.
Michigan: Michigan Department of Environmental Quality, Geological Survey Division.
Mississippi: Mississippi Department of Environmental Quality, Office of Geology.
Missouri: Missouri Department of Natural Resources, Division of Geology and Land Survey.
Montana: Montana Bureau of Mines and Geology.
Nebraska: University of Nebraska-Lincoln, Nebraska Geological Survey.
Nevada: Nevada Bureau of Mines and Geology.
New Hampshire: New Hampshire Department of Environmental Services.
New Jersey: New Jersey Geological Survey.

New Mexico: New Mexico Bureau of Mines and Mineral Resources.
New York: New York Geological Survey.
North Carolina: North Carolina Geological Survey.
North Dakota: North Dakota Geological Survey.
Ohio: Ohio Department of Natural Resources, Division of Geological Survey.
Oklahoma: Oklahoma Geological Survey.
Pennsylvania: Pennsylvania Bureau of Topographic and Geologic Survey.
Puerto Rico: Puerto Rico Department of Natural Resources, Bureau of Geology.
Rhode Island: Rhode Island Geological Survey.
South Carolina: South Carolina Geological Survey.
South Dakota: South Dakota Geological Survey.
Tennessee: Tennessee Department of Environment and Conservation, Division of Geology.
Texas: The University of Texas at Austin, Bureau of Economic Geology.
Utah: Utah Geological Survey.
Vermont: Vermont Geological Survey.
Virginia: Virginia Department of Mines, Minerals and Energy.
Washington: Washington State Department of Natural Resources, Division of Geology and Earth Resources.
West Virginia: West Virginia Geological and Economic Survey.
Wisconsin: Wisconsin Geological and Natural History Survey.
Wyoming: Wyoming State Geological Survey.

John H. DeYoung, Jr.
Chief Scientist, Minerals Information Team

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SURVEY METHODS FOR NONFUEL MINERALS

By Jeffrey P. Busse

The U.S. Geological Survey (USGS) collects worldwide data on virtually every commercially important nonfuel mineral commodity. These data form the base for tracking and assessing the health of the minerals sector of the U.S. economy.

The USGS data collection activity was instituted by the 47th Congress in the appropriations act of August 7, 1882 (22 Stat. 329), which placed the collection of mineral statistics on an annual basis. The most recent authority for the USGS survey activity is the National Materials and Minerals Policy, Research and Development Act of 1980 (Public Law 96-479, 96th Congress). This act strengthens protection for proprietary data provided to the U.S. Department of the Interior by persons or firms engaged in any phase of mineral or mineral-material production or consumption.

Data Collection Surveys

The USGS begins the collection of domestic nonfuel minerals and materials statistics by appraising the information requirements of Government and private organizations of the United States. Requirements that can be met by collecting data from minerals establishments are posed as questions on USGS surveys. Figure 1 shows a typical survey form.

Specific questions about mineral commodity activities, such as production, consumption, and shipments, are structured in the survey forms to provide meaningful aggregated data. Thus, the entire mineral economic cycle from production through consumption is covered by 140 monthly, quarterly, semiannual, and annual surveys.

After the survey form has been designed, a list of the appropriate establishments to be canvassed is developed. Many sources are used to determine which companies, mines, plants, and other operations should be included on the survey mailing list. State Geologists, Federal organizations (e.g. Mine Safety and Health Administration), trade associations, industry representatives, and trade publications and directories are some of the sources that are used to develop and update survey listings. With few exceptions, a complete canvass of the list of establishments is used rather than a sample survey. The iron and steel scrap industry is one of the exceptions where a sample survey is conducted.

The Paperwork Reduction Act requires that any Government agency wanting to collect information from 10 or more individuals or establishments must first obtain approval from the Office of Management and Budget (OMB). The OMB approves the need to collect the data and protects industry from unwarranted Government paperwork.

Survey Processing

The USGS surveys approximately 18,000 establishments. Each year, the USGS mails about 34,000 forms for 140 different surveys. Each completed survey form returned to the USGS undergoes extensive analysis to ensure the highest possible accuracy of the mineral data. The statistical staff monitors all surveys to ensure that errors are not created by reporting in physical units different from the units requested on the form. Relations between related measures, such as produced crude ore and marketable crude ore, are analyzed for consistency. Engineering relations, such as recovery factors from ores and concentrates, also are used. The totals for each form are verified, and currently reported data are checked against prior reports to detect possible errors or omissions.

For the majority of the surveys, which are automated, the forms are reviewed to ensure that data are complete and correct before entering into the computer database. The computer is programmed to conduct a series of automated checks to verify mathematical consistency and to identify discrepancies between the data reported and logically acceptable responses.

The USGS is modernizing and automating the minerals information survey-processing and data-dissemination functions. Automated commodity data system functions include computerized preparation of statistical tables, the use of desktop publishing to integrate text and tables, and electronic dissemination through the Internet.

Survey Responses.—To enable the reader to understand better the basis on which the statistics are calculated, each commodity annual report includes a section about domestic data coverage. This section briefly describes the data sources, the number of establishments surveyed, the response percentage, and the method of estimating the production or consumption for nonrespondents.

To produce reliable aggregated data, the USGS uses efficient procedures for handling instances of nonresponse. Failure to return the initial survey form results in a second mailing of the form. If the second form is not returned, then telephone calls are made to the nonrespondents. The followup calls provide the necessary data to complete the survey forms and/or to verify questionable data entries. Periodic visits to minerals establishments also are made by USGS mineral commodity specialists to gather missing data and to explain the importance of the establishment's reporting. By describing the use of the published statistics and showing the impact of nonresponse, the USGS strives to encourage respondents to give complete and accurate replies.

The OMB publication "Guidelines for Reducing Reporting Burden" stipulates that the minimum acceptable response rate is 75% of the panel surveyed. In addition, the USGS strives for a minimum reporting level of 75% of the quantity produced or consumed (depending on the survey) for certain key statistics. Response rates are periodically reviewed. For those surveys not meeting the minimum reporting level, procedures are developed and implemented to improve response rates.

Estimation for Nonresponse.—When efforts to obtain a response to a survey fail, estimation or imputation techniques must be used to account for missing data. Some of the estimation methods depend on knowledge of prior establishment reporting, and other techniques rely on external information to estimate the missing data. When survey forms are received after the current publication has been completed, the forms are edited, necessary imputations are made for missing data, and the survey database is updated. The revised data are reported in later publications.

Protection of Proprietary Data.—The USGS relies on the cooperation of the U.S. minerals industry to provide the mineral data that are presented in this and other USGS publications. Without a strong response to survey requests, the USGS would not be able to present reliable statistics. The USGS, in turn, respects the proprietary nature of the data received from the individual companies and establishments. To ensure that proprietary rights will not be violated, the USGS analyzes each of the aggregated statistics to determine if the data reported by an individual establishment can be deduced from the aggregated statistics. If, for example, only two significant producers of a mineral commodity are in a given State, then the USGS will not publish the State total because either producer could readily estimate the production of the other. It is this obligation to protect proprietary information that results in the withheld, or W, entries in the published tables. If a company gives permission in writing, however, then the USGS will publish the data as long as the data from other respondents are protected from disclosure.

International Data

International data are collected by USGS country specialists and international data coordinators. The data are gathered from various sources, which include published reports of foreign Government mineral and statistical agencies, international organizations, the U.S. Department of State, the United Nations, the Organization of Petroleum Exporting Countries, and personal contact by specialists traveling abroad. Each February, minerals questionnaires are sent to foreign organizations requesting estimates of mineral production for the host country for the preceding year. Missing data are estimated by USGS country specialists on the basis of historical trends and the specialist's knowledge of current production capabilities in each country.

Publications

The USGS disseminates current and historical minerals information through printed publications, Compact Disk-Read Only Memory (CD-ROM) and its World Wide Web site.

Printed Publications.—The Minerals Yearbook summarizes annually, on a calendar-year basis, the significant economic and technical developments in the mineral industries. Three volumes are issued each year—volume I, Metals and Minerals; volume II, Area Reports—Domestic; and volume III, Area Reports—International. Volume I presents, by mineral commodity, salient statistics on production, trade, consumption, reserves, and other measures of economic activity. Volume II reviews the U.S. minerals industry by State and island possessions. Volume III is published as four separate regional reports that cover more than 190 foreign countries. These reports contain individual country chapters that examine the mining, refining, processing, and use of minerals in each country in the region and how they relate to U.S. industry.

Mineral Commodity Summaries (MCS), which is an up-to-date summary of about 80 nonfuel mineral commodities, is the earliest Government publication to furnish estimates that cover the previous year's nonfuel mineral industry data. It contains information on the domestic industry structure, Government programs, tariffs, 5-year salient domestic statistics, and a summary of significant events, trends, and issues in the international minerals industry during the past year.

The Minerals Yearbook and MCS may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, (202) 512-1800.

CD-ROM.—Most minerals information publications are available on a CD-ROM format. This includes Minerals Yearbook chapters published since 1994, Mineral Commodity Summaries published since 1996, and recently released quarterly and monthly Mineral Industry Surveys. An updated CD-ROM is published in February, June, and October.

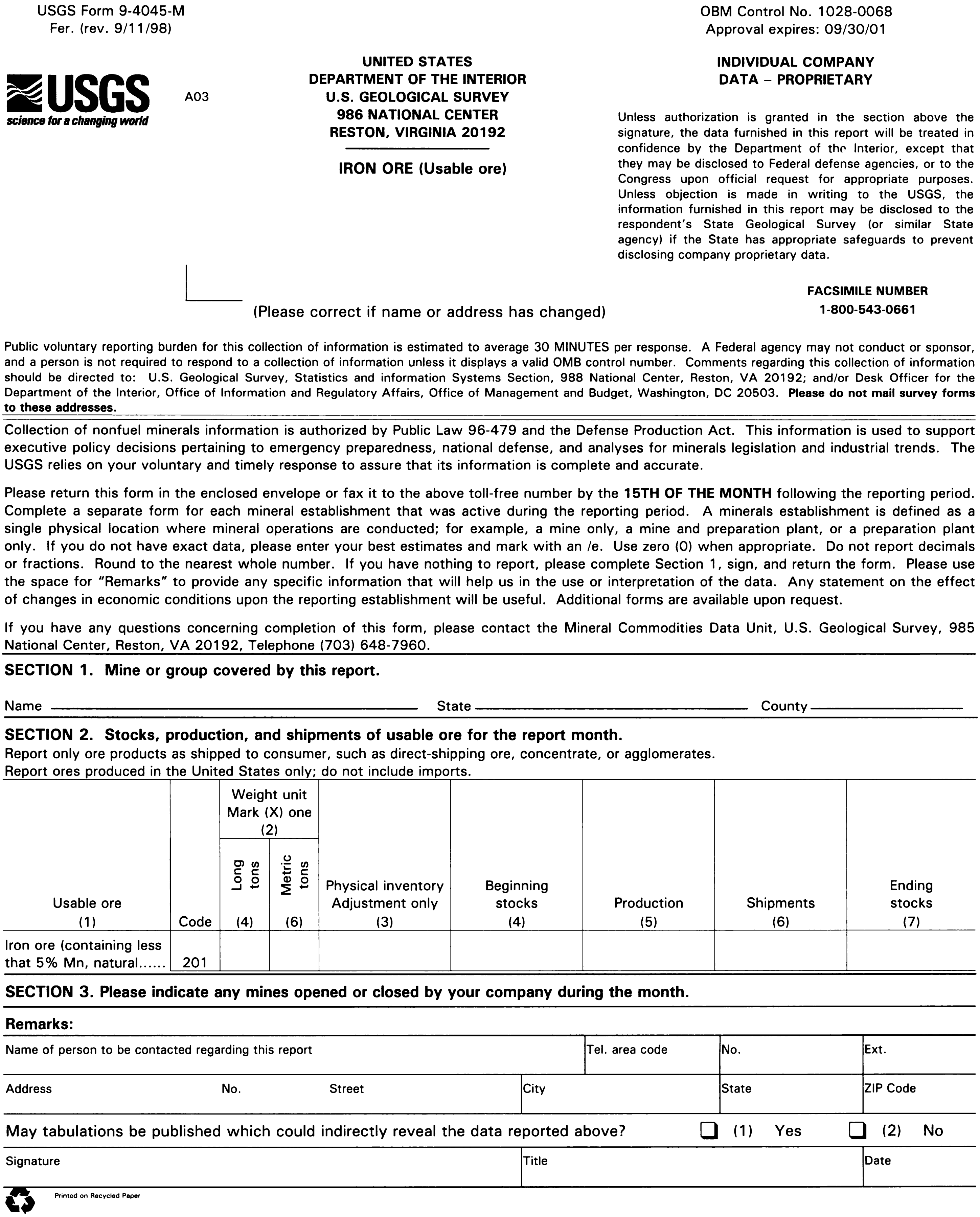
The CD-ROM may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, (202) 512-1800.

Electronic Publications.—In addition to USGS printed publications and CD-ROM, the USGS disseminates current and historical minerals information through its World Wide Web site. All minerals information publications from 1996 to the present are available to view or download. The Web site also provides information on other products and contacts for minerals information and links to other mineral-related sites on the World Wide Web. The Uniform Resource Locator (URL) is http://minerals.usgs.gov/minerals.

Mineral Industry Surveys (MIS) contain timely statistical and economic data on minerals. The surveys are designed to keep Government agencies and the public, particularly the mineral industry and the business community, informed of trends in the production, distribution, inventories, and consumption of minerals. Frequency of issue depends on the demand for current data. The MIS are released monthly, quarterly, semiannually, and annually.

Metal Industry Indicators (MII), which is published monthly, contains indexes that measure the current and future performance of five U.S. metal industries. For each of the five industries, a composite coincident index and a composite leading index have been developed based on procedures and data similar to those used to construct the Conference Board's coincident and leading cyclical indicators for the national economy. Leading and coincident indexes for the stone, clay, glass, and concrete products industry, which measure the current and future performance of the industrial minerals industry, also are published monthly. The indexes were designed by using the same procedures as the USGS metal composite indexes.

FIGURE 1
A TYPICAL SURVEY FORM



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Collection of nonfuel minerals information is authorized by Public Law 96-479 and the Defense Production Act. This information is used to support executive policy decisions pertaining to emergency preparedness, national defense, and analyses for minerals legislation and industrial trends. The USGS relies on your voluntary and timely response to assure that its information is complete and accurate.

Please return this form in the enclosed envelope or fax it to the above toll-free number by the **15TH OF THE MONTH** following the reporting period. Complete a separate form for each mineral establishment that was active during the reporting period. A minerals establishment is defined as a single physical location where mineral operations are conducted; for example, a mine only, a mine and preparation plant, or a preparation plant only. If you do not have exact data, please enter your best estimates and mark with an /e. Use zero (0) when appropriate. Do not report decimals or fractions. Round to the nearest whole number. If you have nothing to report, please complete Section 1, sign, and return the form. Please use the space for "Remarks" to provide any specific information that will help us in the use or interpretation of the data. Any statement on the effect of changes in economic conditions upon the reporting establishment will be useful. Additional forms are available upon request.

If you have any questions concerning completion of this form, please contact the Mineral Commodities Data Unit, U.S. Geological Survey, 985 National Center, Reston, VA 20192, Telephone (703) 648-7960.

SECTION 1. Mine or group covered by this report.

Name ______ State ______ County ______

SECTION 2. Stocks, production, and shipments of usable ore for the report month.
Report only ore products as shipped to consumer, such as direct-shipping ore, concentrate, or agglomerates.
Report ores produced in the United States only; do not include imports.

Usable ore (1)	Code	Weight unit Mark (X) one (2)		Physical inventory Adjustment only (3)	Beginning stocks (4)	Production (5)	Shipments (6)	Ending stocks (7)
		Long tons (4)	Metric tons (6)					
Iron ore (containing less that 5% Mn, natural......	201							

SECTION 3. Please indicate any mines opened or closed by your company during the month.

Remarks:

Name of person to be contacted regarding this report	Tel. area code	No.	Ext.
Address No. Street	City	State	ZIP Code

May tabulations be published which could indirectly reveal the data reported above? ☐ (1) Yes ☐ (2) No

Signature	Title	Date

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PRELIMINARY STATISTICAL SUMMARY

By Stephen D. Smith

This preliminary report summarizes data on crude nonfuel mineral production[1] for the United States, its island possessions, and the Commonwealth of Puerto Rico.

Although crude mineral production may be measured at any of several stages of extraction and processing, the stage of measurement used in this annual report is what is termed "mine output." This term refers to minerals or ores in the form in which they are first extracted from the ground, but customarily may include the output from auxiliary processing at or near the mines.

Because of inadequacies in the statistics available, some series deviate from the foregoing definition. For copper, gold, lead, silver, tin, and zinc, the quantities shown are recorded on a mine basis (as the recoverable content of ore sold or treated). The values assigned to the quantities, however, are based on the average selling price of refined metal, not the mine value.

Mercury is measured as recovered metal and valued at the average New York price for the metal. Values shown are in current dollars, with no adjustments made to compensate for changes in the purchasing power of the dollar.

The preliminary total value of all nonfuel mineral production in the United States decreased by more than 1% to \$38.9 billion in 2001, with metals decreasing by almost 10% to \$9.1 billion and industrial minerals increasing by almost 2% to \$29.7 billion compared with those of 2000.[2] Eight of the mineral commodities produced in the United States in 2001 had preliminary individual total production values that were greater than \$1 billion. These commodities were, in descending order, stone (crushed), cement (portland), sand and gravel (construction), gold, copper, iron ore (usable), lime, and, salt. They composed more than 77% of the U.S. total production value (table 1).

In 2001, 14 States produced nonfuel mineral commodities with preliminary individual total production values that were greater than \$1 billion. These States were, in descending order, California, Nevada, Texas, Arizona, Florida, Michigan, Georgia, Minnesota, Missouri, Utah, Pennsylvania, Ohio, Alaska, and New York. They composed almost 62% of the U.S. total production value (table 3).

---

[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2001 USGS mineral production data published in this chapter are preliminary estimates as of August 2002 and are expected to change. For some mineral commodities, such as construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Specialist contact information may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals/contacts/comdir.html; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2] Values, percentage calculations, and rankings for 2000 may differ from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also be subject to change.

TABLE 1
NONFUEL MINERAL PRODUCTION IN THE UNITED STATES 1/ 2/

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral		1999		2000		2001 p/	
		Quantity	Value	Quantity	Value	Quantity	Value
Metals:							
Antimony 3/	metric tons	450	W	W	W	300	W
Beryllium concentrates	do.	5,070	6	4,510	5	4,500	5
Copper 4/		1,600	2,680,000	1,450 r/	2,810,000 r/	1,330	2,230,000
Gold 4/	kilograms	341,000	3,070,000	353,000	3,180,000	350,000	3,150,000
Iron ore, usable		58,500	1,550,000	61,000	1,560,000	6,000	1,530,000
Iron oxide pigments, crude	metric tons	44,100	7,740	57,100	4,470	62,100	4,120
Lead 4/	do.	503,000	485,000	449,000 r/	431,000 r/	420,000	404,000
Molybdenum concentrates 3/	do.	42,800	251,000	40,900 r/	W	37,600	W
Palladium 3/	kilograms	9,800	114,000	10,300	228,000	12,000	177,000
Platinum 3/	do.	2,920	35,600	3,110	69,200	3,600	52,800
Rare-earth metal concentrates e/ 3/	metric tons	5,000	14,400	5,000	W	W	W
Silver 4/	do.	1,950	329,000	1,860	300,000	1,800	289,000
Zinc 4/	do.	771,000	909,000	805,000 r/	987,000 r/	830,000	824,000
Combined value of mercury, titanium concentrates, vanadium, zirconium concentrates, and values indicated by symbol W		XX	368,000	XX	555,000	XX	472,000
Total		XX	9,810,000	XX	10,100,000	XX	9,140,000
Industrial minerals, excluding fuels:							
Asbestos	metric tons	7,190	W	5,260	W	5,440	W
Barite		434	11,100	392	9,840	400	10,100
Boron		1,220	630,000	1,070	557,000	1,070	557,000
Bromine	metric tons	239,000	213,000	228,000	206,000	204,000	185,000
Cement:							
Masonry		4,380	452,000 e/	4,330	461,000 r/ e/	4,270	452,000 e/
Portland		81,600	6,280,000 e/	83,500	6,440,000 e/	85,400	6,570,000 e/
Clays:							
Ball		1,200	48,000	1,140	48,400	1,170	49,200
Bentonite		4,070	176,000	3,760	155,000	3,820	159,000
Common		24,800	145,000	23,700	135,000	23,700	135,000
Fire		402	6,770	476	7,560	391	6,430
Fuller's earth		2,560	231,000	2,910	254,000	2,400	214,000
Kaolin		9,160	948,000	8,800	929,000	9,030	930,000
Diatomite		747	178,000	677	173,000	W	W
Feldspar	metric tons	875,000	42,700	790,000	44,500	780,000	42,300
Garnet, industrial	do.	60,700	6,170	60,200	7,060	52,500	6,240
Gemstones		NA	16,100	NA	17,200	NA	15,300
Gypsum, crude		22,400	157,000	19,500	165,000	18,800	159,000
Helium:							
Crude	million cubic meters	63	57,200	62	56,600	137	272,000
Grade-A	do.	117	233,000	127	251,000	57	62,100
Iodine	metric tons	1,620	23,800	1,470	21,500	1,710	20,900
Kyanite e/		90	12,700	90	13,400	90	13,400
Lime		19,600	1,180,000	19,600	1,180,000	18,700	1,120,000
Mica, crude		102	15,900	104	14,100	95,500	14,300
Peat		834	22,100	847	22,700	936	21,300
Perlite, crude	metric tons	711,000	23,800	672,000	22,700	650,000	20,500
Phosphate rock, marketable		40,600	1,240,000	38,600	932,000	34,200	855,000
Potash		2,500	280,000	2,600	290,000	2,500	280,000
Pumice and pumicite	metric tons	643,000	17,800	697,000	16,900	687,000	16,900
Salt		44,400	1,110,000	43,300	1,040,000	45,100	1,040,000
Sand and gravel:							
Construction		1,110,000	5,250,000	1,120,000	5,390,000	1,120,000	5,500,000
Industrial		28,900	538,000	28,400	556,000	28,800	561,000
Silica stone 5/	metric tons	475	3,060	312	4,610	312	4,610
Soda ash		10,200	779,000	10,200	748,000	10,300	780,000
Stone, crushed 6/		1,540,000	8,240,000	1,560,000	8,390,000	1,620,000	8,950,000

See footnotes at end of table.

TABLE 1--Continued
NONFUEL MINERAL PRODUCTION IN THE UNITED STATES 1/ 2/

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral		1999		2000		2001 p/	
		Quantity	Value	Quantity	Value	Quantity	Value
Industrial minerals, excluding fuels--Continued:							
Tripoli	metric tons	84,900	20,200	72,000	15,900 e/	72,000 e/	15,900 e/
Vermiculite	do.	175,000 e/	W	150,000 e/	W	150,000	W
Zeolites	do.	40,100	NA	(7/)	NA	(7/)	NA
Combined value of brucite, emery, greensand marl, lithium, magnesite, magnesium compounds, olivine, pyrophyllite (crude), staurolite, stone (dimension), sulfur (Frasch), talc (crude), vermiculite (crude), wollastonite, and values indicated by symbol W		XX	675,000	XX	619,000	XX	706,000
Total		XX	29,300,000	XX	29,200,000	XX	29,700,000
Grand total		XX	39,100,000	XX	39,300,000	XX	38,900,000

e/ Estimated. p/ Preliminary. r/ Revised. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined value."
XX Not applicable.

1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/ Data are rounded to three significant digits; may not add to totals shown.

3/ Content of ore and concentrate.

4/ Recoverable content of ores, etc.

5/ Includes grindstones, pulpstones, and sharpening stones; excludes mill liners and grinding pebbles.

6/ Excludes abrasive stone and bituminous limestone and sandstone; all included elsewhere in table.

TABLE 2
NONFUEL MINERALS PRODUCED IN THE UNITED STATES, BY COMMODITY AND STATES IN 2001 p/

(Principal States based upon quantity unless otherwise noted)

Mineral	Principal States	Other States (alphabetical order)
Antimony 1/	ID	
Asbestos	CA	
Barite	NV, GA, TN	
Beryllium concentrate	UT	
Boron	CA	
Bromine	AR and MI	
Brucite	NV and TX	
Cement:		
Masonry	CA, FL, AL, IN, SC	AZ, AR, CO, GA, HI, IA, KS, KY, ME, MD, MI, MO, MT, NE, NM, NY, OH, OK, PA, SD, TN, TX, VA, WA, WV.
Portland	TX, CA, PA, MI, MO	All other States, except AK, CT, DE, LA, MA, MN, NH, NJ, NC, ND, RI, VT, WI.
Clays:		
Ball	TN, TX, KY, MS	
Bentonite	WY, MT, AL, MS, TX	AZ, CA, CO, NV, OR, UT.
Common	NC, TX, AL, GA, OH	All other States, except AK, DE, HI, ID, NV, NH, RI, VT, WI.
Fire	MO, OH, SC, CA, CO	KY.
Fuller's earth	GA, MO, MS, FL, VA.	CA, IL, KS, NV, TN, TX.
Kaolin	GA, AL, SC, TX, CA	AR, FL, NV, NC, TN.
Copper 1/	AZ, UT, NM, MO, NV	AK, ID, MT.
Diatomite	CA, NV, OR, WA	
Emery	OR	
Feldspar	NC, CA, VA, GA, OK	ID and SD.
Garnet, industrial	ID, NY, MT	
Gemstones, natural 2/	TN, AZ, CA, OR, UT	All other States.
Gold 1/	NV, UT, AK, CA, MT	AZ, CO, ID, NM, SD, WA.
Greensand marl	NJ	
Gypsum, crude	OK, IA, NV, MI, TX	AZ, AR, CA, CO, IN, KS, LA, MI, NM, NY, OH, SD, UT, WA, WY.
Helium:		
Crude	KS, TX, OK	
Grade-A	KS, WY, TX, CO, OK	UT.
Iodine	OK	
Iron ore, usable	MN, MI, NM, SD	
Iron oxide pigments, crude	GA, MO, MI, AL, VA	AZ.
Kyanite	VA	
Lead 1/	MO, AK, ID, MT, NV	NY.
Lime	MO, KY, AL, OH, TX	All other States, except AK, CT, DE, FL, HI, KS, ME, MD, MS, NH, NJ, NY, NC, RI, SC, VT.
Lithium minerals	NV	
Magnesite	NV	
Magnesium compounds	MI, FL, UT, DE, CA	
Magnesium metal	WA and UT	
Mercury	NV	
Mica, crude	NC, NM, GA, SC, SD	VA.
Molybdenum	AZ, CO, UT, ID, NM	MT.
Olivine	NC and WA	
Palladium 1/	MT	
Peat	FL, MI, MN, IN, IL	IA, ME, MT, NJ, NY, NC, OH, PA, WA, WV, WI.
Perlite	NM, OR, AZ, UT, CA	NV and ID.
Phosphate rock	FL, ID, NC, UT	
Platinum 1/	MT	
Potash	NM, UT, MI	
Pumice and pumicite	OR, CA, NM, ID, AZ	KS.
Pyrophyllite, crude 3/	NC and CA	
Rare-earth metal concentrates	CA	
Salt	LA, TX, NY, OH, KS	AL, AZ, CA, MI, NV, NM, OK, TN, UT, WV.
Sand and gravel:		
Construction	CA, TX, MI, AZ, OH	All other States.
Industrial	IL, MI, WI, CA, TX	All other States, except AK, CT, DE, HI, KY, ME, MA, MT, NH, OR, SD, UT, VT, WY.
Silica stone 4/	AR and WI	
Silver 1/	NV, AK, ID, AZ, UT	CA, CO, MO, MT, NM, SD, WA.

See footnotes at end of table.

TABLE 2--Continued

NONFUEL MINERALS PRODUCED IN THE UNITED STATES, BY COMMODITY AND STATES IN 2001 p/

(Principal States based upon quantity unless otherwise noted)

Mineral	Principal States	Other States (alphabetical order)
Soda ash	WY, CA, CO	
Staurolite	FL	
Stone:		
Crushed	TX, PA, FL, OH, IL	All other States, except DE.
Dimension	IN, VT, WI, NY, TX	All other States, except AK, DE, FL, HI, IL, IA, KY, LA, MS, NE, NV, NJ, ND, OR, RI, WY.
Talc, crude 3/	MT, TX, VT, NY, VA	OR.
Titanium concentrates:		
Ilmenite	FL and VA	
Rutile	FL	
Tripoli	IL, OK, AR, PA	
Vanadium 1/	ID	
Vermiculite, crude	SC and VA	
Wollastonite	NY	
Zeolites	NM, TX, OR, NV, AZ	ID and CA.
Zinc 1/	AK, TN, MO, MT, NY	ID.
Zirconium concentrates	FL and VA	

p/ Preliminary.

1/ Content of ores, etc.

2/ Principal producing States based on value.

3/ Formerly part of mineral grouping "Talc and Pyrophyllite."

4/ Grindstones, pulpstones, and sharpening stones; excludes mill liners and grinding pebbles.

TABLE 3
VALUE OF NONFUEL MINERAL PRODUCTION IN THE UNITED STATES AND PRINCIPAL NONFUEL MINERALS PRODUCED IN 2001 p/ 1/

State	Value (thousands)	Rank	Percent of U.S. total	Principal minerals, in order of value
Alabama	$938,000	16	2.41	Cement (portland), stone (crushed), lime, sand and gravel (construction), cement (masonry).
Alaska	1,060,000	13	2.73	Zinc, gold, lead, silver, sand and gravel (construction).
Arizona	2,170,000	4	5.59	Copper, sand and gravel (construction), cement (portland), molybdenum concentrates, stone (crushed).
Arkansas	491,000	30	1.26	Bromine, stone (crushed), cement (portland), sand and gravel (construction), gypsum (crude).
California	3,250,000	1	8.35	Sand and gravel (construction), cement (portland), boron, stone (crushed), gold.
Colorado	577,000	24	1.48	Sand and gravel (construction), cement (portland), stone (crushed), gold, molybdenum concentrates.
Connecticut 2/	104,000	42	0.27	Stone (crushed), sand and gravel (construction), stone (dimension), clays (common), gemstones.
Delaware 2/	13,100	50	0.03	Sand and gravel (construction), magnesium compounds, gemstones.
Florida	1,750,000	5	4.50	Phosphate rock, stone (crushed), cement (portland), sand and gravel (construction), cement (masonry).
Georgia	1,610,000	7	4.13	Clays (kaolin), stone (crushed), cement (portland), clays (fuller's earth), sand and gravel (construction).
Hawaii	69,700	45	0.18	Stone (crushed), cement (portland), sand and gravel (construction), cement (masonry), gemstones.
Idaho	346,000	35	0.89	Phosphate rock, silver, sand and gravel (construction), molybdenum concentrates, lead.
Illinois	911,000	17	2.34	Stone (crushed), cement (portland), sand and gravel (construction), sand and gravel (industrial), lime.
Indiana	718,000	20	1.85	Stone (crushed), cement (portland), sand and gravel (construction), lime, cement (masonry).
Iowa	487,000	31	1.25	Cement (portland), stone (crushed), sand and gravel (construction), gypsum (crude), lime.
Kansas	640,000	22	1.65	Cement (portland), helium (Grade-A), salt, stone (crushed), helium (crude).
Kentucky	531,000	26	1.37	Stone (crushed), lime, cement (portland), sand and gravel (construction), clays (ball).
Louisiana	274,000	37	0.70	Salt, sulfur (Frasch), sand and gravel (construction), stone (crushed), sand and gravel (industrial).
Maine	91,000	44	0.23	Sand and gravel (construction), cement (portland), stone (crushed), cement (masonry), peat.
Maryland 2/	356,000	33	0.92	Stone (crushed), cement (portland), sand and gravel (construction), cement (masonry), stone (dimension).
Massachusetts 2/	209,000	39	0.54	Stone (crushed), sand and gravel (construction), stone (dimension), lime, clays (common).
Michigan	1,620,000	6	4.17	Cement (portland), iron ore (usable), sand and gravel (construction), stone (crushed), magnesium compounds.
Minnesota	1,440,000	8	3.70	Iron ore (usable), sand and gravel (construction), stone (crushed), stone (dimension), sand and gravel (industrial).
Mississippi	177,000	41	0.45	Sand and gravel (construction), clays (fuller's earth), cement (portland), stone (crushed), sand and gravel (industrial).
Missouri	1,340,000	10	3.45	Stone (crushed), cement (portland), lead, lime, zinc.
Montana	503,000	29	1.29	Palladium, gold, platinum, cement (portland), sand and gravel (construction).
Nebraska 2/	91,400	43	0.24	Cement (portland), stone (crushed), sand and gravel (construction), lime, cement (masonry).
Nevada	2,930,000	2	7.53	Gold, sand and gravel (construction), silver, lime, cement (portland).
New Hampshire 2/	60,300	47	0.16	Sand and gravel (construction), stone (crushed), stone (dimension), gemstones.
New Jersey 2/	348,000	34	0.90	Stone (crushed), sand and gravel (construction), sand and gravel (industrial), greensand marl, peat.
New Mexico	614,000	23	1.58	Copper, potash, sand and gravel (construction), cement (portland), stone (crushed).
New York	1,050,000	14	2.70	Stone (crushed), salt, cement (portland), sand and gravel (construction), zinc.
North Carolina	744,000	19	1.91	Stone (crushed), phosphate rock, sand and gravel (construction), sand and gravel (industrial), feldspar.
North Dakota	39,300	48	0.10	Sand and gravel (construction), lime, stone (crushed), clays (common), sand and gravel (industrial).
Ohio	1,070,000	12	2.74	Stone (crushed), sand and gravel (construction), salt, lime, cement (portland).
Oklahoma	530,000	28	1.36	Stone (crushed), cement (portland), sand and gravel (construction), sand and gravel (industrial), gypsum (crude).
Oregon	326,000	36	0.84	Stone (crushed), sand and gravel (construction), cement (portland), diatomite, lime.
Pennsylvania 2/	1,270,000	11	3.27	Stone (crushed), cement (portland), sand and gravel (construction), lime, cement (masonry).
Rhode Island 2/	28,300	49	0.07	Stone (crushed), sand and gravel (construction), sand and gravel (industrial), gemstones.
South Carolina	531,000	27	1.36	Cement (portland), stone (crushed), cement (masonry), sand and gravel (construction), clays (kaolin).
South Dakota	255,000	38	0.66	Gold, cement (portland), sand and gravel (construction), stone (crushed), stone (dimension).
Tennessee	708,000	21	1.82	Stone (crushed), zinc, cement (portland), sand and gravel (construction), clays (ball).
Texas	2,210,000	3	5.68	Cement (portland), stone (crushed), sand and gravel (construction), lime, salt.
Utah	1,350,000	9	3.46	Copper, gold, cement (portland), sand and gravel (construction), salt.
Vermont 2/	68,900	46	0.18	Stone (dimension), stone (crushed), sand and gravel (construction), talc (crude), gemstones.
Virginia	751,000	18	1.93	Stone (crushed), cement (portland), sand and gravel (construction), lime, clays (fuller's earth).
Washington	545,000	25	1.40	Sand and gravel (construction), stone (crushed), magnesium metal, cement (portland), gold.
West Virginia	185,000	40	0.48	Stone (crushed), cement (portland), sand and gravel (industrial), lime, salt.
Wisconsin 2/	368,000	32	0.95	Sand and gravel (construction), stone (crushed), lime, sand and gravel (industrial), stone (dimension).
Wyoming	986,000	15	2.53	Soda ash, clays (bentonite), helium (Grade-A), cement (portland), stone (crushed).
Undistributed	157,000	XX	0.40	
Total	38,900,000	XX	100.00	

p/ Preliminary. XX Not applicable.

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Partial total; excludes values that must be concealed to avoid disclosing company proprietary data. Concealed values included with "Undistributed."

TABLE 4
VALUE OF NONFUEL MINERAL PRODUCTION PER CAPITA AND PER SQUARE KILOMETER IN 2000, BY STATE p/ 1/

State	Area (square kilometers)	Population (thousands)	Total value (thousands)	Per capita		Per square kilometer	
				Dollars	Rank	Dollars	Rank
Alabama	134,000	4,460	$938,000	210	13	7,000	18
Alaska	1,530,000	635	1,060,000	1,670	2	693	48
Arizona	295,000	5,310	2,170,000	410	6	7,360	16
Arkansas	138,000	2,690	491,000	182	15	3,570	28
California	411,000	34,500	3,250,000	94	30	7,900	13
Colorado	270,000	4,420	577,000	131	19	2,140	40
Connecticut	13,000	3,430	104,000 2/	30	48	7,990	12
Delaware	5,290	796	13,100 2/	17	50	2,470	38
Florida	152,000	16,400	1,750,000	107	25	11,500	3
Georgia	153,000	8,380	1,610,000	192	14	10,500	6
Hawaii	16,800	1,220	69,700	57	42	4,160	26
Idaho	216,000	1,320	346,000	262	10	1,600	42
Illinois	146,000	12,500	911,000	73	35	6,250	22
Indiana	93,700	6,110	718,000	117	23	7,660	14
Iowa	146,000	2,920	487,000	167	16	3,340	29
Kansas	213,000	2,690	640,000	237	12	3,000	32
Kentucky	105,000	4,070	531,000	131	20	5,080	25
Louisiana	124,000	4,470	274,000	61	41	2,220	39
Maine	86,200	1,290	91,000	71	36	1,060	47
Maryland	27,100	5,380	356,000 2/	66	38	13,100	2
Massachusetts	21,500	6,380	209,000 2/	33	47	9,720	9
Michigan	152,000	9,990	1,620,000	162	17	10,700	5
Minnesota	219,000	4,970	1,440,000	289	9	6,580	20
Mississippi	124,000	2,860	177,000	62	40	1,430	43
Missouri	181,000	5,630	1,340,000	238	11	7,440	15
Montana	381,000	904	503,000	556	5	1,320	44
Nebraska	200,000	1,710	91,400 2/	53	44	456	49
Nevada	286,000	2,110	2,930,000	1,390	3	10,200	7
New Hampshire	24,000	1,260	60,300 2/	48	45	2,510	37
New Jersey	20,200	8,480	348,000 2/	41	46	17,300	1
New Mexico	315,000	1,830	614,000	336	8	1,950	41
New York	127,000	19,000	1,050,000	55	43	8,250	11
North Carolina	136,000	8,190	744,000	91	34	5,450	24
North Dakota	183,000	634	39,300	62	39	214	50
Ohio	107,000	11,400	1,070,000	94	32	9,970	8
Oklahoma	181,000	3,460	530,000	153	18	2,930	34
Oregon	251,000	3,470	326,000	94	31	1,300	45
Pennsylvania	117,000	12,300	1,270,000 2/	104	28	10,800	4
Rhode Island	3,140	1,060	28,300 2/	27	49	9,020	10
South Carolina	80,600	4,060	531,000	131	21	6,590	19
South Dakota	200,000	757	255,000	338	7	1,280	46
Tennessee	109,000	5,740	708,000	123	22	6,480	21
Texas	691,000	21,300	2,210,000	104	27	3,200	30
Utah	220,000	2,270	1,350,000	593	4	6,120	23
Vermont	24,900	613	68,900 2/	112	24	2,770	35
Virginia	106,000	7,190	751,000	105	26	7,120	17
Washington	176,000	5,990	545,000	91	33	3,090	31
West Virginia	62,800	1,800	185,000	103	29	2,950	33
Wisconsin	145,000	5,400	368,000 2/	68	37	2,530	36
Wyoming	253,000	494	986,000	1,990	1	3,890	27
Undistributed	XX	XX	157,000	XX	XX	XX	XX
Total or average	9,370,000 3/	284,000 3/	38,900,000	137	XX	4,150	XX

p/ Preliminary. XX Not applicable.

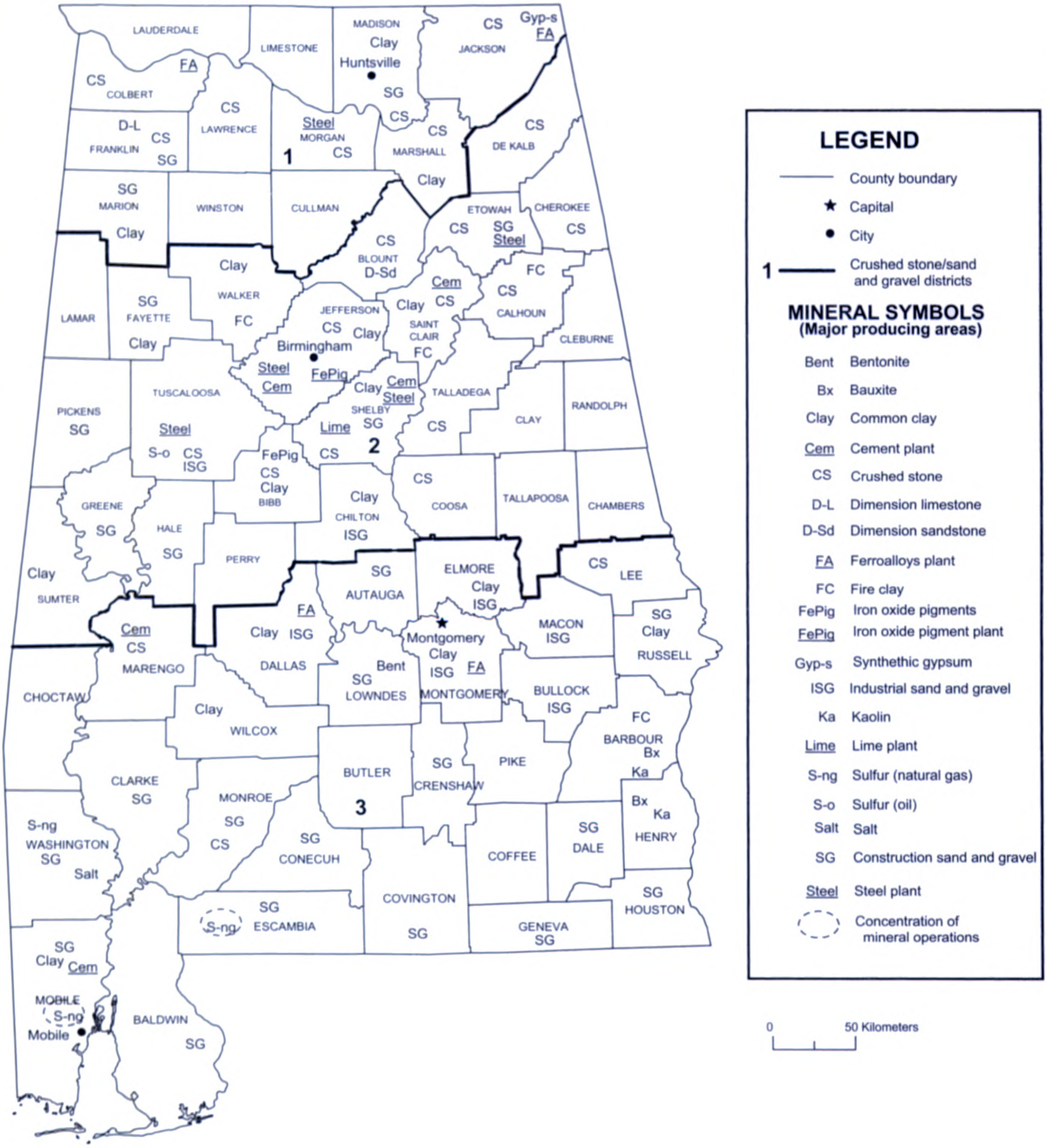
1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Partial total; excludes values that must be concealed to avoid disclosing company proprietary data. Concealed values included with "Undistributed."

3/ Excludes Washington, DC (which has no mineral production), with an area of 179 square kilometers and a population of 572,000.

Sources: U.S. Geological Survey and U.S. Census Bureau.

ALABAMA



Source: Geological Survey of Alabama/U.S. Geological Survey (2001)

THE MINERAL INDUSTRY OF ALABAMA

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Geological Survey of Alabama for collecting information on all nonfuel minerals.

In 2001, the estimated value[1] of nonfuel mineral production for Alabama was $938 million, based upon preliminary U.S. Geological Survey (USGS) data. This was about a 1% increase from that of 2000,[2] following a 6% decrease from 1999 to 2000. The State remained 16th among the 50 States in total nonfuel mineral production value, of which Alabama accounted for almost 2.5% of the U.S. total.

The top four nonfuel mineral commodities produced in Alabama in 2001 (based upon preliminary data) were, in descending order of value, cement (portland and masonry combined), crushed stone, lime, and construction sand and gravel, accounting for 94% of the State's total production value. The combined value of cement (portland and masonry) and crushed stone represented nearly 76% of the total (table 1). In 2000, the State's overall drop in value resulted mostly from the decrease in crushed stone, down $54 million, and the lowered values of portland cement and construction sand and gravel, down $7 million and $5 million, respectively. The largest increases occurred in lime, up about $7 million, and kaolin.

Nonfuel mineral production in Alabama consisted entirely of industrial minerals. Compared with USGS estimates of the quantities produced in the other 49 States in 2001, Alabama remained second in kaolin; third in lime, common clays, and bentonite; fourth of six iron oxide pigment-producing States; was one of the top five masonry cement-producing States; and remained eighth in salt. While the State rose to second from third in lime and to third from fifth in masonry cement, it went from fifth to sixth in portland cement. Additionally, Alabama was a significant producer of crushed stone, construction sand and gravel, and industrial sand and gravel. No metals were mined in the State. All metal production in the State, especially that of raw steel, was the result of processing materials acquired from other domestic and foreign sources. Production of a natural mixture of bauxite (no longer used to produce primary aluminum) and bauxitic clay with a very low iron oxide content has been reported to the USGS since 1995 as kaolin; it is primarily used to make refractory products.

The Geological Survey of Alabama[3] provided the narrative information that follows. In 2001, there were 112 companies or operations involved in the mining and production of industrial mineral resources. This included 45 limestone-dolomite operations for crushed stone that were active in the State. In addition, granite, sandstone, and quartzite operations for crushed stone were active. Marble operations were active for the production of micronized calcium carbonate and building stone. There were 17 clay (common clay, bentonite, fuller's earth, kaolin, fire clay) operations active in the State, along with 48 sand and gravel operations. Other operations include chalk, building stone (marble, limestone, and sandstone), salt, and recovered sulfur.

Mineral exploration in Alabama has continued to focus on industrial resources with several large expansions in the State. The Alabama Development Office reported recent capital investment in new or expanding industrial mineral operations to be more than $20 million. This included crushed stone, common clay (for brick and tile), and fire clay (Alabama Development Office, 2001). Another record in the production of crushed stone (limestone, dolomite, granite, marble, sandstone, and quartzite) in Alabama was reported for 2001. Birmingham, Alabama-based Vulcan Materials Co. remained the largest construction aggregate producer in the country. The State's newest dimension stone operation was inactive during the year due to litigation (Faulk, 2001). This operation was the first to market Silurian age varicolored limestone quarried in Lauderdale County, AL.

More information on geology, hydrology, occurrence, mining history, and general economics of specific mineral resources in Alabama is available from the Geological Survey of Alabama.

References Cited

Alabama Development Office, 2001, Alabama Development Office 2000 Industry Report: Montgomery, AL, Alabama Development Office, 32 p.

Faulk, Kent, 2001, Marble quarry in Lauderdale a real gold mine: The Birmingham News, January 25, p. 1A.

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[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2001 USGS mineral production data published in this chapter are preliminary estimates as of August 2002 and are expected to change. For some mineral commodities, such as construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Specialist contact information may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals/contacts/comdir.html; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2] Values, percentage calculations, and rankings for 2000 differ from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also change.

[3] Lewis S. Dean, a geologist at the Geological Survey of Alabama, authored the text of the State mineral industry information provided by that agency.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN ALABAMA 1/ 2/

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral	1999		2000		2001 p/	
	Quantity	Value	Quantity	Value	Quantity	Value
Cement:						
Masonry	429	47,600 e/	401	45,600 e/	420 e/	47,200 e/
Portland	4,300	349,000 e/	4,340	342,000 e/	4,360 e/	344,000 e/
Clays:						
Bentonite	W	W	W	W	174	5,300
Common	2,300	23,700	2,090	23,200	2,090	23,300
Gemstones	NA	76	NA	108	NA	108
Lime	1,930	114,000	1,950	121,000	1,830	111,000
Sand and gravel:						
Construction	15,500	68,900	14,500	63,700	13,000	58,100
Industrial	687	9,780	731	10,100	836	12,300
Stone:						
Crushed	49,100 r/	354,000 r/	49,100	300,000	50,500	318,000
Dimension metric tons	7,210	2,380	W	W	W	W
Combined values of clays (kaolin), iron oxide pigments (crude), salt, and values indicated by symbol W	XX	20,400	XX	24,400	XX	19,000
Total	XX	990,000	XX	930,000	XX	938,000

e/ Estimated. p/ Preliminary. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined values" data. XX Not applicable.

1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/ Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 2
ALABAMA: CRUSHED STONE SOLD OR USED, BY KIND 1/

Kind	1999				2000			
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone 2/	52 r/	41,100 r/	$230,000 r/	$5.58 r/	49	39,500	$237,000	$5.98
Dolomite	3	W	W	8.11	3	W	W	7.09
Marble	4	3,450	91,100	26.42	3	W	W	6.50
Sandstone	5	1,010 r/	6,220	6.14	6	2,310	15,500	6.71
Granite	3 r/	W	W	7.38	1	W	W	5.80
Slate	1	W	W	5.83	2	W	W	6.77
Miscellaneous stone	3	57	401	7.04	4	51	182	3.57
Total or average	XX	49,100 r/	354,000 r/	7.22 r/	XX	49,100	300,000	6.11

r/ Revised. W Withheld to avoid disclosing company proprietary data; included in "Total." XX Not applicable.

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Includes limestone-dolomite reported with no distinction between the two.

TABLE 3
ALABAMA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+1 1/2 inch):			
Macadam	W	W	$7.74
Riprap and jetty stone	195	$1,340	6.85
Filter stone	W	W	5.35
Other coarse aggregate	518	3,650	7.04
Total or average	713	4,980	6.99
Coarse aggregate, graded:			
Concrete aggregate, coarse	653	3,880	5.94
Bituminous aggregate, coarse	1,790	11,100	6.21
Bituminous surface-treatment aggregate	W	W	5.32
Other graded coarse aggregate	6,670	42,600	6.38
Total or average	9,110	57,500	6.32
Fine aggregate (-3/8 inch):			
Stone sand, concrete	222	1,410	6.33
Stone sand, bituminous mix or seal	226	1,480	6.54
Screening, undesignated	203	1,060	5.20
Other fine aggregate	2,780	14,200	5.10
Total or average	3,430	18,100	5.28
Coarse and fine aggregates:			
Graded road base or subbase	1,220	6,700	5.49
Unpaved road surfacing	W	W	5.00
Crusher run or fill or waste	W	W	5.33
Other coarse and fine aggregates	5,400	34,000	6.29
Total or average	6,630	40,700	6.14
Other construction materials	298	1,980	6.66
Agricultural, agricultural limestone	(3/)	(3/)	5.67
Chemical and metallurgical:			
Cement manufacture	1,810	5,180	2.86
Lime manufacture	(3/)	(3/)	5.10
Flux stone	(3/)	(3/)	6.43
Sulfur oxide removal	(4/)	(4/)	(4/)
Miscellaneous uses, refractory stone (including ganister)	(3/)	(3/)	4.13
Unspecified: 5/			
Reported	16,800	109,000	6.50
Estimated	7,600	49,000	6.47
Total or average	24,400	159,000	6.49
Grand total or average	49,100	300,000	6.11

W Withheld to avoid disclosing company proprietary data; included in "Other."

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes dolomite, granite, limestone, marble, miscellaneous stone, sandstone, and slate.

3/ Withheld to avoid disclosing company proprietary data; included in "Grand total."

4/ Less than ½ unit.

5/ Reported and estimated production without a breakdown by end use.

TABLE 4
ALABAMA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE AND DISTRICT 1/

Use	District 1 Quantity (metric tons)	District 1 Value (thousands)	District 2 Quantity (metric tons)	District 2 Value (thousands)	District 3 Quantity (metric tons)	District 3 Value (thousands)	Unspecified districts Quantity (metric tons)	Unspecified districts Value (thousands)
Construction:								
Coarse aggregate (+1 1/2 inch) 2/	W	W	W	W	W	W	--	--
Coarse aggregate, graded 3/	4,010	$24,400	4,950	$31,300	W	W	W	W
Fine aggregate (-3/8 inch) 4/	1,220	6,500	2,200	11,500	W	W	W	W
Coarse and fine aggregate 5/	3,280	17,000	2,770	15,900	W	W	W	W
Other construction materials	243	1,510	55	470	--	--	--	--
Agricultural 6/	W	W	W	W	--	--	--	--
Chemical and metallurgical 7/	--	--	3,120	11,900	--	--	--	--
Other miscellaneous uses 8/	--	--	W	W	--	--	--	--
Unspecified: 9/								
Reported	2,240	15,300	11,300	76,000	3,270	$18,200	--	--
Estimated	750	5,000	6,800	44,000	--	--	--	--
Total	12,400	73,700	32,700	198,000	3,950	27,900	57	$267

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes filter stone, macadam, riprap and jetty stone, and other coarse aggregate.

3/ Includes concrete aggregate (coarse), bituminous aggregate (coarse), bituminous surface-treatment aggregate, and other graded coarse aggregate.

4/ Includes stone sand (concrete), stone sand bituminous mix or seal, screening (undesignated), and other fine aggregate.

5/ Includes crusher run (select material or fill), graded road base or subbase, unpaved road surfacing, and other coarse and fine aggregates.

6/ Includes agricultural limestone.

7/ Includes cement manufacture, flux stone, lime manufacture, and sulfur oxide removal.

8/ Includes refractory stone (including ganister).

9/ Reported and estimated production without a breakdown by end use.

TABLE 5
ALABAMA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand) 2/	4,870	$18,600	$3.81
Concrete products (blocks, bricks, pipe, decorative, etc.)	217	1,560	7.20
Asphaltic concrete aggregates and other bituminous mixtures	794	4,260	5.37
Road base and coverings	437	2,160	4.95
Road stabilization (lime)	16	69	4.31
Fill	402	1,280	3.17
Other miscellaneous uses 3/	349	1,580	4.52
Unspecified: 4/			
Reported	4,040	19,100	4.72
Estimated	3,300	15,000	4.56
Total or average	14,500	63,700	4.41

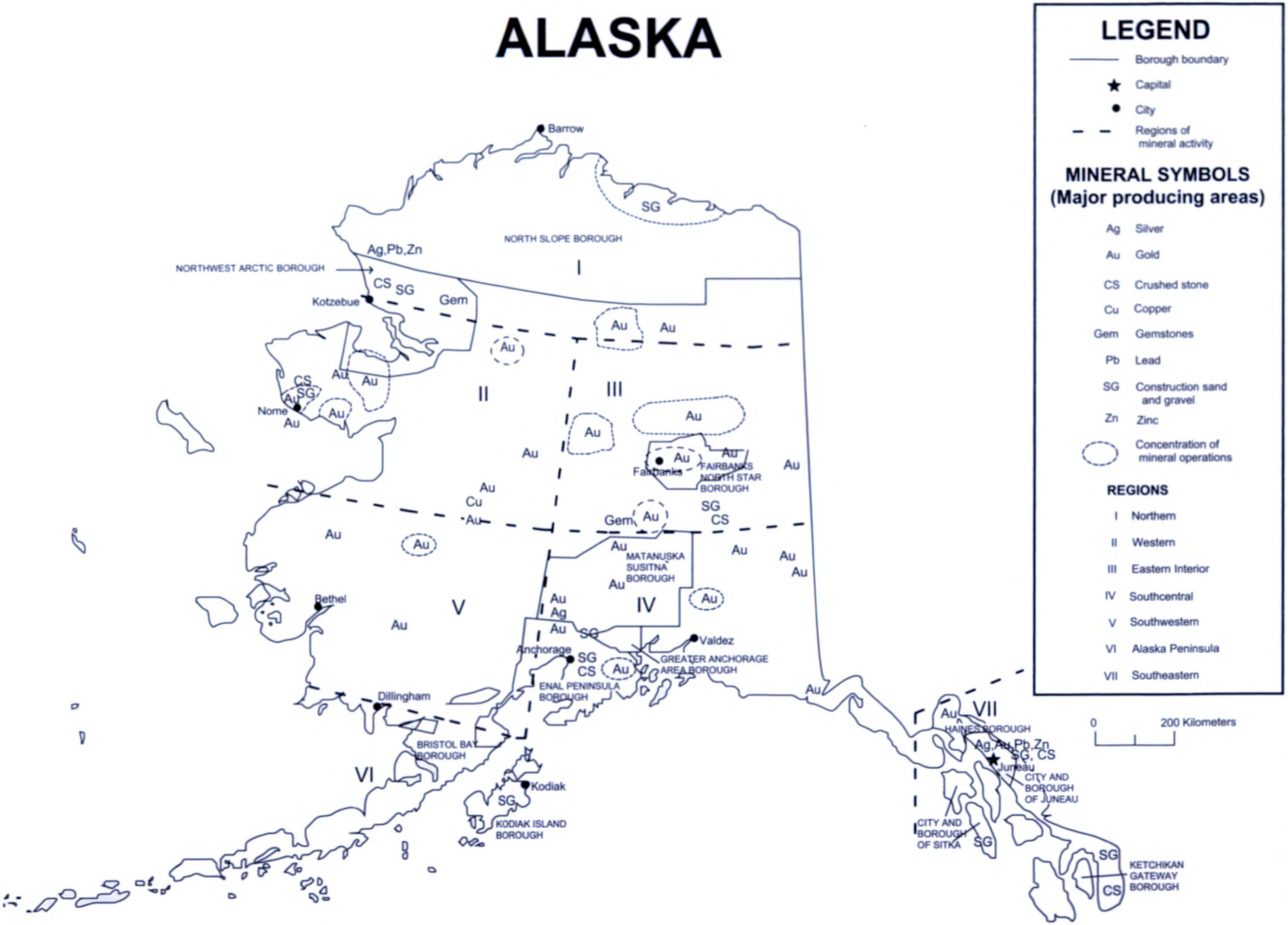
1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes plaster and gunite sands.

3/ Includes snow and ice control.

4/ Reported and estimated production without a breakdown by end use.

ALASKA



Source: Alaska Division of Geological and Geophysical Surveys/U.S. Geological Survey (2001)

THE MINERAL INDUSTRY OF ALASKA

In 2001, the estimated value[1] of nonfuel mineral production for Alaska was about $1.06 billion, based upon preliminary U.S. Geological Survey (USGS) data. This was about a 5% decrease from that of 2000[2] and followed 2 years with the same overall total value. The State was 13th in rank in 2001 (12th in 2000) among the 50 States in total nonfuel mineral production value and accounted for about 3% of the U.S. total.

Metallic minerals continued during 2001 to account for about 90% of the State's total nonfuel mineral production value. A large majority of this was from the production of zinc, lead, and silver (descending order of value) at Teck Cominco Alaska Inc.'s Red Dog Mine, which is near Kotzebue in northwestern Alaska, and gold production from the Kinross Gold Corp.'s Fort Knox Mine, which is near Fairbanks in east-central Alaska. (During 2001, Teck Corp. bought controlling interest of Cominco Ltd., and the new company became Teck Cominco Ltd.; the Alaskan subsidiary became Teck Cominco Alaska Inc.) In 2001, most of the State's decrease in nonfuel mineral value resulted from a reduction in the production and value of zinc. But this drop in value was partially moderated by significant increases in the values of construction sand and gravel, lead, and gold. In 2000, conversely, a substantial increase in the production and value of zinc (along with a smaller yet significant increase in construction sand and gravel) was offset mostly by decreases that occurred in the values of gold, silver, lead, and, to a lesser degree, crushed stone, resulting in the State's unchanged total value from that of 1999 (table 1).

Based upon USGS estimates of the quantities produced in the 50 States during 2001, Alaska remained first in zinc and second in lead and silver. The State rose to third from fourth in the production of gold.[3] Production of peat was not reported to the USGS partly because of reporting difficulties associated with the seasonal, intermittent nature of the mineral commodity's mining in the State. The Alaska Department of Natural Resources, Division of Geological and Geophysical Surveys (DGGS), estimated peat production to be about 27,600 cubic meters for an estimated value of about $180,000. Additionally, the DGGS reported production of jade and soapstone combined to be about 1.8 metric tons (t) at an estimated value of $25,000 (Swainbank and Szumigala, 2002).

The DGGS provided the following narrative information; the data are based on DGGS surveys and estimates (Swainbank and Szumigala, 2002). Throughput at the mill at the Greens Creek Mine near Juneau set a record in 2001, but metal production was down due to milling of lower grade ore. Production at the Red Dog Mine was comparable to that of 2000, as fine tuning of the mill continued well into the last quarter of 2001. Production in 2002 at Red Dog was expected to increase by about 8%. At the Fort Knox Mine, blending of the True North gold ore with the regular Fort Knox ore led to record production in 2001, and with a full year of operation, gold production was expected to increase in 2002. The number of placer gold mines and the amount of placer gold produced continued the steady decline since 1997.

In 2001, Teck Corp. bought controlling interest of Cominco Ltd., and the new company became Teck Cominco Ltd. The Alaskan subsidiary is now Teck Cominco Alaska Inc., and it operated the Red Dog Mine near Kotzebue on behalf of the owner, NANA Regional Corp. The mine milled a record 3.2 million metric tons (Mt) of ore to produce 518,000 dry metric tons of contained zinc, 95,000 dry metric tons of contained lead, and an estimated 184,000 kilograms (kg) of silver. The head grades were 19.8% for zinc, 5.0% for lead, and 86 grams per metric ton (g/t) for silver, resulting in a slight decline in the amount of contained zinc and a slight increase in the amount of lead from that of 2000.

The mine employed about 560 people, including miners, millworkers, maintenance, and portsite workers. Food and accomodations were provided by NANA-Marriott, and trucking was contracted to NANA-Lynden. During the summer shipping and supply season an additional 90 workers were hired for approximately 3 months, and four tugs were used to haul barges out to deeper water to load and offload oceangoing freighters.

Red Dog was a conventional open pit operation, using only three dozers, three 11-cubic-meter loaders, and five 77-t haul trucks, with a water/sand truck, two graders, and two utility loaders. Due to the high grade of the ore, the equipment is only about 45% utilized.

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[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2001 USGS mineral production data published in this chapter are preliminary estimates as of August 2001 and are expected to change. For some mineral commodities, such as construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Specialist contact information may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals/contacts/comdir.html; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2] Values, percentage calculations, and rankings for 2000 may differ from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also change.

[3] Gold figures in table 1, as reported to the USGS, may differ with estimates made by the Alaska Department of Natural Resources, Division of Geological and Geophysical Surveys (DGGS). The canvassing of gold placer mineral production was discontinued by the U.S. Bureau of Mines (the Federal agency responsible for U.S. nonfuel mineral production data collection from 1924-94) in 1994. Gold production and value data in table 1 contain data that will be further estimated by the USGS in cooperation with the DGGS. Current estimates based on data collected by the DGGS indicate the production quantity in 1999, 16,100 kg valued at $144 million; in 2000, 17,200 kg valued at $154 million; and in 2001, 17,100 kg valued at $149 million (Swainbank and Szumigala, 2002). The USGS final 1999-2001 total gold production and value data for Alaska, done in collaboration with the DGGS, will be published in the USGS Mineral Industry Surveys—Gold, 2001 Annual Review and in the Gold chapter in Volume I of the 2001 USGS Minerals Yearbook.

Several small placer gold mines reported production in the northern region during 2001, mainly near Wiseman, and there was production from many of the sand and gravel pits near the North Slope oilfields.

American Reclamation Group LLC continued to leach gold from about 680,000 t of ore at the Illinois Creek open pit gold-silver mine south of Galena and intended to continue mining in 2002. Several small placer mines on the Seward Peninsula near Nome and near McGrath also reported some production. Sand and gravel was produced from pits in the Nome area on land owned by Alaska Gold Co., a subsidiary of NovaGold Resources Inc., and a substantial quantity of rock was used in reconstruction of the runway at McGrath.

In April 2001, Fairbanks Gold Mining Inc., a subsidiary of Kinross Gold Corp., began mining at the Hindenburg Pit of True North Mine about 13 kilometers northwest of its mine and mill at Fort Knox. The new mine became fully operational in July. The ore, averaging about 2 g/t, is trucked to the mill at Fort Knox Mine at a rate of about 9,000 metric tons per day, where it is blended with about 27,000 t of Fort Knox ore, averaging about 0.79 g/t. A total of 14 Mt of ore was milled in 2001 to produce 137,000 kg of gold, with a workforce of 360.

About 20 placer gold mines in the eastern interior region reported at least some production.

Several quarries and gravel pits in the eastern interior region produced material for roadwork, mainly on the Taylor Highway and in the Fairbanks area.

The Alaska Railroad hauled a record 3.1 Mt of gravel from pits near Palmer to the Anchorage area, and production was reported from five other operations throughout the area. Production of sand and gravel was reported at Platinum and Kalskag for local work and at Igiugig and Egegik for projects in Togiak, Naknek, Dillingham, and Pedro Bay.

The only major mine in the southeastern region, the Greens Creek Mine, is 29.73% owned by Hecla Mining Co. and 70.27% by Kennecott Minerals Co. In 2001, it milled a record 597,000 t of ore grading 12.12% zinc, 4.75% lead, 746 g/t silver, and 6.7 g/t gold to produce 48,100 dry metric tons of zinc, 17,500 dry metric tons of lead, 301 t of silver, and 2,280 kg of gold.

Exploration expenditures decreased from $35 million in 2000 to $22 million in 2001, while development expenditures dropped from $142 million in 2000 to $83 million in 2001. The low metal prices also affected the ability of companies to raise capital for exploration, not only in Alaska but globally, and this trend is likely to continue into the year 2002. Compared to the past several years, exploration activity was more evenly distributed throughout Alaska. The eastern interior region saw a sharp reduction in activity, while the Seward Peninsula and southeastern Alaska experienced a rebirth in activity. Gold remained the major exploration commodity, but polymetallic and platinum-group-element exploration increased from recent levels.

The decline in the amount expended on development in 2001 resulted mainly from the completion of the $105 million Mill Optimization Project at the Red Dog Mine in northwestern Alaska early in 2001 and also from the completion of the adit into the Liese ore body at Pogo Mine in the eastern interior region. Permitting and road and pit development at True North Mine west of Fort Knox Mine near Fairbanks was completed by midyear.

During 2001, the State of Alaska resumed airborne geophysical surveys under the auspices of the DGGS. Three areas were selected: the northeastern extension of the Upper Chulitna area in the vicinity of Broad Pass-Cantwell; part of the Bonnifield district east of Healy; and part of the Goodpaster mining district southeast of the Pogo deposit. The results were expected to be released in early 2002.

DGGS geologists spent 3 weeks conducting geologic ground-truthing, including geologic mapping and geochemical sampling, in the Salcha River-Pogo geophysical survey area of the Big Delta Quadrangle. A team of DGGS geologists also spent 1 month conducting geologic mapping and geochemical sampling in the Eagle A-1 Quadrangle of the Fortymile area. New geologic maps of the Eagle A-2 Quadrangle based on previous fieldwork were released in 2001, and new geologic maps based on 2001 fieldwork will be released in May 2002.

U.S. Bureau of Land Management (BLM) geologists began field investigations in the Aniak mining district as part of a 5-year study. The BLM geologists were aided by geologists from Calista Corp. and DGGS.

The minerals industry paid almost $7 million to the State of Alaska in 2001, of which slightly more than $2 million was for mining license taxes. An additional $9.7 million was paid to municipalities, and mining companies were the largest taxpayers in the city and Borough of Juneau, and the Fairbanks North Star, Denali, and Northwest Arctic Boroughs. Overall, payments to the State and the boroughs totaled $16.76 million, slightly more than in 2000.

Reference Cited

Swainbank, R.C., and Szumigala, D.J., 2002, Alaska's mineral industry 2001—A summary: Alaska Department of Natural Resources, Division of Geological and Geophysical Surveys, Information Circular 48, 15 p.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN ALASKA 1/ 2/

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral	1999 Quantity	1999 Value	2000 Quantity	2000 Value	2001 p/ Quantity	2001 p/ Value
Gemstones	NA	11	NA	11	NA	12
Gold 3/ 4/ kilograms	16,200	177,000	15,600	140,000	16,500	148,000
Sand and gravel, construction	9,620	48,500	10,600	53,500	14,000	71,800
Stone, crushed	1,800 5/	9,900 5/	1,400	7,110	1,500	7,850
Combined values of copper , lead, silver, stone [crushed dolomite, limestone, shell, slate (1999)], zinc	XX	880,000	XX	911,000 r/	XX	833,000
Total	XX	1,120,000	XX	1,120,000 r/	XX	1,060,000

p/ Preliminary. r/ Revised. NA Not available. XX Not applicable.

1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/ Data are rounded to no more than three significant digits; may not add to totals shown.

3/ Recoverable content of ores, etc.

4/ Data collected by the State.

5/ Excludes certain stones; kind and value included with "Combined values" data.

TABLE 2
ALASKA: CRUSHED STONE SOLD OR USED, BY KIND 1/ 2/

	1999				2000			
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone-dolomite	1	W	W	$6.00	--	--	--	--
Granite	1	(3/)	(3/)	8.26	2	(3/)	(3/)	$5.14
Shell	1	W	W	4.33	--	--	--	--
Traprock	4	(3/)	(3/)	5.05	4	(3/)	(3/)	5.03
Slate	1	W	W	6.00	--	--	--	--
Miscellaneous stone	9	1,280	$7,180	5.61	6	611	$3,130	5.12
Total or average	XX	1,800	9,900	5.51	XX	1,400	7,110	5.08

W Withheld from total to avoid disclosing company proprietary data. XX Not applicable. – Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Data derived, in part, from Alaska Division of Geological and Geophysical Surveys Information.

3/ Withheld to avoid disclosing company proprietary data; included in "Total."

TABLE 3
ALASKA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE 1/ 2/ 3/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregates (+1 1/2 inch):			
Riprap and jetty stone	(4/)	(4/)	(4/)
Other coarse aggregate	W	W	$7.33
Coarse and fine aggregates, graded road base or subbase	W	W	3.62
Unspecified: 5/			
Reported	510	$2,630	5.16
Estimated	850	4,300	5.08
Total or average	1,400	7,110	5.08

W Withheld to avoid disclosing company proprietary data; included in "Total."

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Data derived, in part, from Alaska Division of Geological and Geophysical Surveys Information.

3/ Includes granite, miscellaneous stone, and traprock.

4/ Less than ½ unit.

5/ Reported and estimated production without a breakdown by end use.

TABLE 4
ALASKA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY MAJOR USE CATEGORY 1/

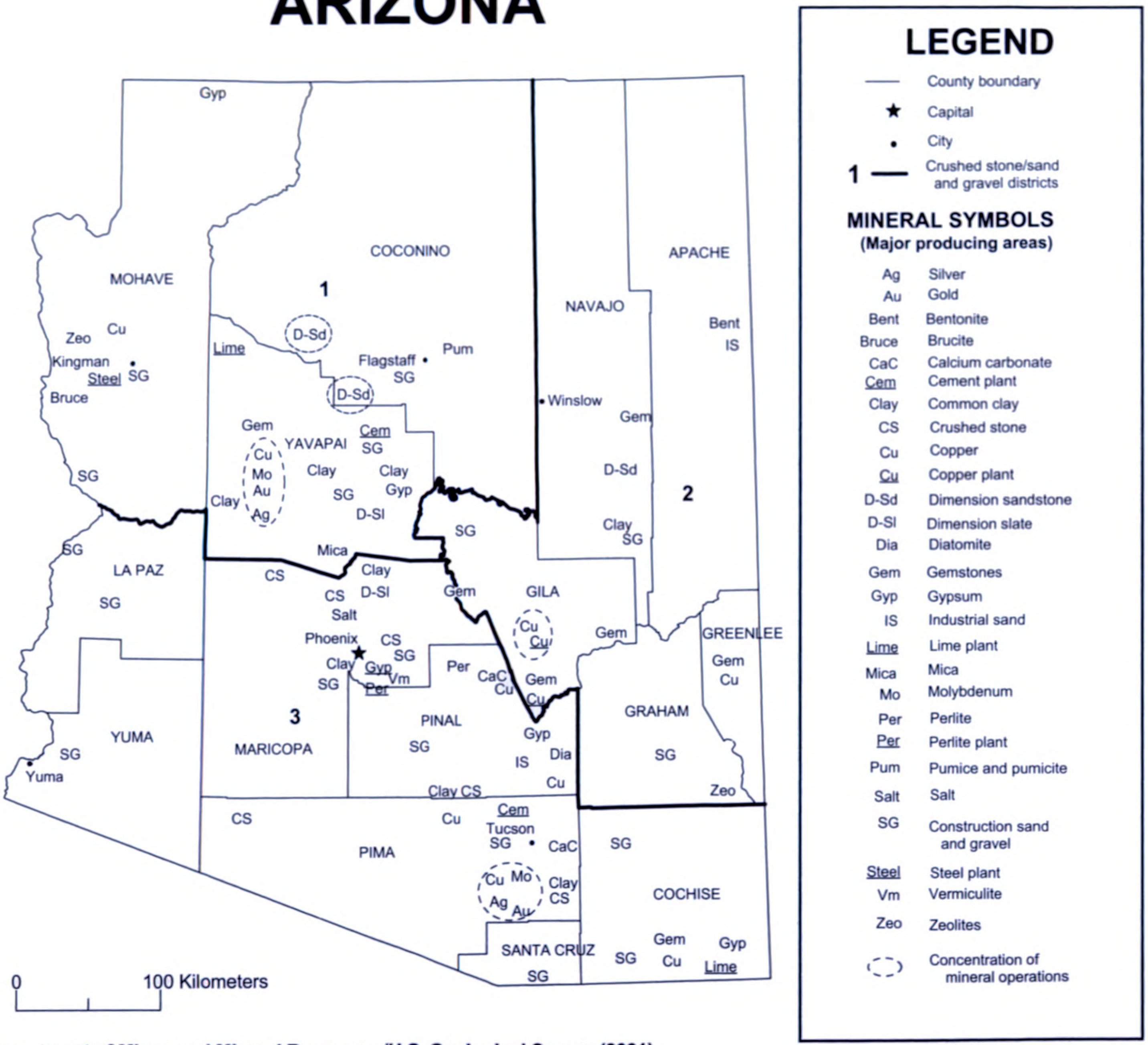
Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand) 2/	1,460	$5,900	$4.03
Concrete products (blocks, bricks, pipe, decorative, etc.)	33	237	7.18
Asphaltic concrete aggregates and other bituminous mixtures	652	4,970	7.63
Road base and coverings	443	2,520	5.68
Fill	1,200	3,680	3.06
Snow and ice control	9	74	8.22
Railroad ballast	129	1,070	8.32
Other miscellaneous uses	2	10	5.00
Unspecified: 3/			
Reported	6,290	33,200	5.28
Estimated	360	1,800	5.06
Total or average	10,600	53,500	5.06

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes plaster and gunite sands.

3/ Reported and estimated production without a breakdown by end use.

ARIZONA



Source: Arizona Department of Mines and Mineral Resources/U.S. Geological Survey (2001)

THE MINERAL INDUSTRY OF ARIZONA

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Arizona Department of Mines and Mineral Resources for collecting information on all nonfuel minerals.

In 2001, the estimated value[1] of nonfuel mineral production for Arizona was $2.17 billion, based upon preliminary U.S. Geological Survey (USGS) data. This was about a 14% decrease from the $2.51 billion of 2000,[2] and followed a 1% increase from 1999 to 2000. Arizona accounted for more than 5% of the U.S. total nonfuel mineral production and was fourth in the Nation in total nonfuel mineral production value.

Arizona continued in 2001 as the top copper-producing State, accounting for nearly two-thirds of total U.S. copper mine production and value. Copper was the State's leading nonfuel mineral, representing about 68% of Arizona's 2001 total nonfuel mineral production value. Both the quantity and the value of copper production decreased, owing to lower average copper prices and the scaling back of some operations. Construction sand and gravel was Arizona's second leading nonfuel mineral, followed by portland cement, molybdenum concentrates, and crushed stone. In 2000, copper mine production was down by about 12% owing to higher average copper prices; the value of production was up almost 3%. The increase in copper's value, about $50 million, an $8 million rise in construction sand and gravel, and a $9 million increase in cement (portland and masonry combined) accounted for most of the increases in the State's nonfuel mineral commodity values in 2000. The largest decreases occurred in molybdenum concentrates, down more than $20 million, silver, crushed stone, gypsum, and gold (table 1). All other changes were on the order of $1 million or less—relatively inconsequential to the State's overall change in value. (Listings of mineral commodities are in descending order of value, magnitude of change in value, or quantity produced.)

Based upon USGS estimates of the quantities produced in the 50 States during 2001, Arizona remained the leading State in molybdenum output; second in gemstones; third in perlite; fourth in construction sand and gravel, silver, and zeolites; fifth in pumice and pumicite; sixth in iron oxide pigments; seventh in bentonite; and eighth in dimension stone. The State rose to 10th from 11th in gold, and it continued to be a significant producer of portland cement, masonry cement, and lime.

The Arizona Department of Mines and Mineral Resources[3] provided the following narrative information. Data may differ somewhat from data reported by the USGS in table 1.

It was a mixed year for mining in Arizona during 2001. A growing population and expanding transportation infrastructure continued to increase demand, and consequently provide markets for three commodities used in construction—sand and gravel, crushed stone, and cement. On the other hand, the State's largest and most important mining segment, the copper industry, was negatively affected by concerns about energy supplies and hit especially hard by very low copper prices. The U.S. producer cathode price was about $0.77 per pound in 2001, $0.88 per pound in 2000, and $0.76 per pound in 1999 (Edelstein, 2002a).

Arizona's copper production has dropped about 30% from its peak of 1.25 million metric tons in 1997 to its current level of 875,000 metric tons (t) in 2001 (table 1). Average monthly employment figures over the 5-year period fell from a peak of 11,400 to 6,500 at the end of 2001, a 43% drop. Despite these declines, Arizona still remains as the leading copper-producing State in the Nation.

The Mission Complex, an open pit and underground copper mining operation composed of the Mission, Eisenhower, Pima, Mineral Hill, South San Xavier, and North San Xavier properties, is located near Sahuarita, AZ. ASARCO Incorporated (Grupo Mexico S.A. de C.V.) revealed plans to cut copper ore production by about 9,000 metric tons per day (t/d) (24%) and lay off about 110 employees at its Mission Mine in Arizona beginning on August 19. Copper production declined by a commensurate amount, or about 16,300 metric tons per year (t/yr). The cutback was attributed to the prevailing low copper prices (Edelstein, 2001). At the end of November 2001, Asarco announced a 23% curtailment in copper ore production owing to "poor market conditions," effective January 1. This was the second curtailment at Mission in 4 months, and a total cutback of 61% since November 2000. Production of copper in concentrate in 2002 was projected to decline to about 45,000 t, down from 115,000 t in 1999 (Edelstein, 2002b).

The Ray complex, near Hayden, AZ, consisted of the 225,000-t/d Ray open pit mine with a 27,000-t/d concentrator and a 47,000 t/yr solvent extraction-electrowinning operation, and the Hayden operations consisted of a 25,000-t/d concentrator and a 650,000-t/yr flash furnace smelter. Asarco processed higher ore grades at the Ray Mine that partly made up for cutbacks at the Mission Mine. The Ray Mine completed a bypass tunnel and other facilities that will achieve the water quality goals of a consent agreement with the U.S. Environmental Protection Agency. The project reduced haulage costs by shortening hauls and created space for leaching and waste dumps in the Mineral Creek area.

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[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2001 USGS mineral production data published in this chapter are preliminary estimates as of August 2001 and are expected to change. For some mineral commodities, such as construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Specialist contact information may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals/contacts/comdir.html; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2] Values, percentage calculations, and rankings for 2000 may differ from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also change.

[3] Niemuth, N.J., Mining Engineer, authored the text of the State mineral industry information provided by the Arizona Department of Mines and Mineral Resources.

The Silver Bell Mine (Grupo Mexico S.A. de C.V. and Mitsui & Co.) produces about 50 t/d of copper cathode. It was located in Marana, AZ, and now operates with facilities inside the boundaries of the new Ironwood National Monument. Asarco sought to acquire 160 hectares through an exchange or boundary adjustment for continued use of an existing road, power/pipeline, and overburden storage. The roads have been in use since the early 1990s and the overburden in place since the 1960s. The Governor of Arizona, the U.S. Secretary of the Interior, and others discussed adjusting the boundaries of the Ironwood Monument, but no resolution was reached.

The Morenci complex, owned by Phelps Dodge Corp. and Sumitomo Metal Mining Arizona, Inc., was the largest copper-producing operation in North America. In March 2001, the mine-for-leach project was completed, converting Morenci production entirely to leach-solvent extraction-electrowinning. As a result of the improvement, the Morenci concentrator was placed on care-and-maintenance status (Phelps Dodge Corp., 2001).

In January 2001, Phelps Dodge issued Worker Adjustment and Retraining Notifications (WARN) to Sierrita employees due to uncertainty related to the availability and price of electrical power and the copper and molybdenum markets. The notices were renewed in March but expired in May without any layoffs. On January 15, 2002, Phelps Dodge announced a series of cutbacks. At Sierrita, it would reduce annual copper production by 45,000 t (50%) and affect 250 employees. Similarly, at Bagdad, annual production was to fall 64,000 t (50%) and affect 250 employees. Miami would temporarily close by January 15, 2002, eliminating 45,000 t of production and resulting in the layoff of 220 workers. Although the Miami smelter would continue to operate, the refinery temporarily closed affecting an additional 70 employees.

Also, in October 2001, Phelps Dodge and Placer Dome signed a joint-venture agreement to develop pressure-leaching technology for base-metal and precious-metal sulfide concentrates. In January 2002, a construction of a pilot demonstration plant to be built at Bagdad was announced. The $40 million plant was to process 15% of Bagdad's concentrates, about 150 t/d, into cathode copper.

Three other companies also were negatively affected by the depressed metal prices and stock markets. AMT International Mining Corp. had difficulty raising funds to continue its Copper Creek project. It gave a deed in lieu of foreclosure to the owners of Ryland Ranch. The property was planned to host surface facilities for the mineral processing plant. Nord Resources Corp. filed a Chapter 11 reorganization case for the purpose of enabling it to develop its Johnson Camp Mine. Mercator Minerals Ltd. failed to complete its acquisition of the Mineral Park Mine. Equatorial Mining Ltd. retained ownership and continued to operate the Mineral Park solvent-extraction leach plant.

Stirling Bridge Cement Co. proposed a new 270,000-t/yr portland cement plant and limestone quarry north of Prescott. The proposed quarry lies within the Prescott National Forest, while the processing plant will be developed on private property. With drilling of the deposit completed, the company is currently preparing an environmental analysis. Rockland Materials, a Phoenix area sand, gravel, and ready-mix concrete producer, would likely use a large portion of the cement production as the two companies have a common owner. In January 2001, Rockland switched its entire fleet of ready-mix concrete trucks and mobile aggregate equipment to 100% soy-based biofuel. Operating about 120 heavy-duty diesel units, Rockland Materials is the only Arizona company to make a complete switch to biofuel. It also represents the largest commercial fleet in the United States to make the conversion. According to owner Grant Goodman, Rockland Materials will spend about $300,000 more to run its fleet with a fuel consumption rate estimated at about 1.2 million gallons per year.

U.S. Borax Inc. explored for evaporites in the Verde Valley. In the same area, drilling by the Arizona Department of Transportation recently identified a lens of thenardite in the Camp Verde formation near the Arizona Route 260 and Interstate–17 interchange.

The Arizona State Legislature passed A.R.S. 37-205, which allows an applicant for mineral leases and sales, if not the successful bidder at auction, to be reimbursed for some costs by the winning party or the State Land Department if a lease or sale is not issued. These costs may include, among others, cultural and environmental assessments and engineering and geologic studies. It is hoped this law will encourage exploration on State lands.

The Arizona Corporation's Securities Division accused Xenolix Technologies Inc. of fraud in a stock promotion. The company had previously been known as Mariah International, Guildmark Industries, and M.G. Gold Corp. The commission alleged that the company had made unregistered offerings of stock at a time it was claiming "to have a patented technology that would extract gold and precious metals from the company's volcanic cinders property." The company agreed, along with other terms, to buy back shares from investors from placements made between 1997 and 1999.

References Cited

Edelstein, D.L., 2001, Copper in August 2001: U.S. Geological Survey Mineral Industry Surveys, November 2001, 11 p.

Edelstein, D.L., 2002a, Copper: U.S. Geological Survey Mineral Commodity Summaries 2002, p. 54-55.

Edelstein, D.L., 2002b, Copper in October 2001: U.S. Geological Survey Mineral Industry Surveys, January, 11 p.

Phelps Dodge Corp., 2001, Form 10-K—Fiscal year ending December 31, 2001: Securities and Exchange Commission, 91 p.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN ARIZONA 1/ 2/

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral		1999		2000		2001 p/	
		Quantity	Value	Quantity	Value	Quantity	Value
Copper 3/		1,050	1,760,000	929 r/	1,810,000 r/	875	1,470,000
Gemstones		NA	1,950	NA	2,920	NA	2,670
Gold 3/	kilograms	786	7,080	W	W	W	W
Molybdenum concentrates	metric tons	15,700	W	W	W	W	W
Sand and gravel:							
Construction		54,500	296,000	59,400	304,000	56,600	294,000
Industrial		268	3,720	W	W	W	W
Silver 3/	metric tons	183	30,900	132	21,200	W	W
Stone, crushed		8,970 r/	53,900 r/	8,030	48,200	7,000	43,300
Zeolites	metric tons	(4/)	NA	(4/)	NA	(4/)	NA
Combined values of cement, clays (bentonite, common), gypsum, (crude), iron oxide pigments (crude), lime, mica (1999), perlite (crude), pumice and pumicite, salt, stone (dimension sandstone), and values indicated by symbol W		XX	334,000	XX	326,000 r/	XX	364,000
Total		XX	2,490,000	XX	2,510,000 r/	XX	2,170,000

p/ Preliminary. r/ Revised. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined values" data. XX Not applicable.

1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/ Data are rounded to no more than three significant digits; may not add to totals shown.

3/ Recoverable content of ores, etc.

4/ Withheld to avoid disclosing company proprietary data.

TABLE 2
ARIZONA: CRUSHED STONE SOLD OR USED, BY KIND 1/

Kind	1999				2000			
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone	8 r/	4,580 r/	$25,100 r/	$5.48 r/	10	4,280	$21,700	$5.07
Granite	21 r/	1,900 r/	14,800 r/	7.78 r/	22	1,870	14,400	7.71
Marble	2	W	W	11.53	2	W	W	8.96
Sandstone and quartzite	2 r/	W	W	11.67 r/	2	W	W	5.00
Traprock	2	W	W	7.07	1	W	W	11.54
Volcanic cinder and scoria	7	232	917	3.95	6	113	464	4.11
Miscellaneous stone	8 r/	1,850 r/	10,200 r/	5.50 r/	12	1,530	8,990	5.90
Total or average	XX	8,970 r/	53,900 r/	6.01 r/	XX	8,030	48,200	6.01

r/ Revised. W Withheld to avoid disclosing company proprietary data, included in "Total." XX Not applicable.

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

TABLE 3
ARIZONA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+1 1/2 inch):			
Riprap and jetty stone	39	$345	$8.85
Filter stone	24	130	5.42
Total or average	63	475	7.54
Coarse aggregate, graded:			
Concrete aggregate, coarse	W	W	6.73
Bituminous aggregate, coarse	28	280	10.00
Bituminous surface-treatment aggregate	W	W	12.70
Railroad ballast	52	460	8.85
Other graded coarse aggregate	389	3,150	8.09
Total or average	469	3,890	8.29

See footnotes at end of table.

TABLE 3--Continued
ARIZONA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction--Continued:			
Fine aggregate (-3/8):			
Stone sand, concrete	(3/)	(3/)	7.19
Stone sand, bituminous mix or seal	(3/)	(3/)	15.52
Screening, undesignated	(3/)	(3/)	5.50
Coarse and fine aggregates:			
Graded road base or subbase	123	717	5.83
Unpaved road surfacing	6	26	4.33
Terrazzo and exposed aggregate	467	6,180	13.24
Crusher run (select material or fill)	30	106	3.53
Other coarse and fine aggregates	8	28	3.50
Total or average	634	7,060	11.13
Other construction materials	6	105	17.50
Chemical and metallurgical:			
Cement manufacture	(3/)	(3/)	5.02
Lime manufacture	(3/)	(3/)	4.95
Other miscellaneous uses and specified uses not listed	35	183	5.23
Unspecified: 4/			
Reported	1,750	10,200	5.86
Estimated	1,100	5,700	5.38
Total or average	2,800	15,900	5.68
Grand total or average	8,030	48,200	6.01

W Withheld to avoid disclosing company proprietary data, included with "Other."

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Includes granite, limestone, marble, miscellaneous stone, sandstone, quartzite, traprock, and volcanic cinder and scoria.

3/ Withheld to avoid disclosing company proprietary data, included in "Grand total."

4/ Reported and estimated production without a breakdown by end use.

TABLE 4
ARIZONA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE AND DISTRICT 1/ 2/

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3		Unspecified districts	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Construction:								
Coarse aggregate (+1 1/2 inch) 3/	2	6	43	306	18	163	--	--
Coarse aggregate, graded 4/	--	--	W	W	W	W	--	--
Fine aggregate (-3/8 inch) 5/	W	W	W	W	--	--	--	--
Coarse and fine aggregate 6/	426	4,750	48	426	160	1,880	--	--
Other construction materials	6	105	--	--	--	--	--	--
Chemical and metallurgical 7/	W	W	--	--	W	W	--	--
Other miscellaneous uses 8/	--	--	--	--	35	183	--	--
Unspecified: 9/								
Reported	699	4,160	37	223	286	1,630	721	4,220
Estimated	230	1,200	--	--	820	4,400	--	--
Total	3,230	18,200	336	3,130	3,740	22,600	721	4,220

W Withheld to avoid disclosing company proprietary data, included in "Total." -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes granite, limestone, marble, miscellaneous stone, sandstone and quartzite, traprock, and volcanic cinder and scoria.

3/ Includes filter stone and riprap and jetty stone.

4/ Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), and railroad ballast.

5/ Includes screening (undesignated), stone sand (concrete), and stone sand (bituminous mix or seal).

6/ Includes crusher run (select material or fill), graded road base or subbase, terrazzo and exposed aggregate, and unpaved road surfacing, and other coarse and fine aggregates.

7/ Includes cement and lime manufacture.

8/ Includes other specified uses not listed.

9/ Reported and estimated production without a breakdown by end use.

TABLE 5
ARIZONA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	14,100	$84,200	$5.98
Plaster and gunite sands	191	2,080	10.88
Concrete products (blocks, bricks, pipe, decorative, etc.)	265	2,960	11.16
Asphaltic concrete aggregates and other bituminous mixtures	3,020	13,000	4.29
Road base and coverings 2/	4,400	21,100	4.79
Road stabilization (cement)	227	382	1.68
Fill	5,500	9,610	1.75
Snow and ice control	15	145	9.67
Railroad ballast	(3/)	5	10.29
Other miscellaneous uses	4,060	16,700	4.11
Unspecified: 4/			
Reported	22,300	127,000	5.67
Estimated	5,300	27,000	5.20
Total or average	59,400	304,000	5.12

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Includes road and other stabilization (lime).

3/ Less than ½ unit.

4/ Reported and estimated production without a breakdown by end use.

TABLE 6
ARIZONA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3		Unspecified districts	
Use	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate (including concrete sand)	701	6,540	377	2,610	13,000	75,000	--	--
Concrete products (blocks, bricks, pipe, decorative, etc.) 2/	57	559	45	373	355	4,100	--	--
Asphaltic concrete aggregates and other bituminous mixtures	W	W	W	W	2,060	9,020	680	1,500
Road base and coverings 3/	312	1,310	435	2,570	3,500	16,900	384	647
Fill	22	84	4,660	5,220	818	4,310	--	--
Snow and ice control	--	--	15	145	--	--	--	--
Railroad ballast	--	--	(4/)	5	--	--	--	--
Other miscellaneous uses	92	726	192	1,730	4,050	16,600	--	--
Unspecified: 5/								
Reported	3,590	19,100	156	822	18,100	106,000	461	763
Estimated	880	4,900	920	5,400	3,500	17,000	--	--
Total	5,660	33,200	6,800	18,900	45,400	249,000	1,530	2,910

W Withheld to avoid disclosing company proprietary data, included with "Other miscellaneous uses." -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

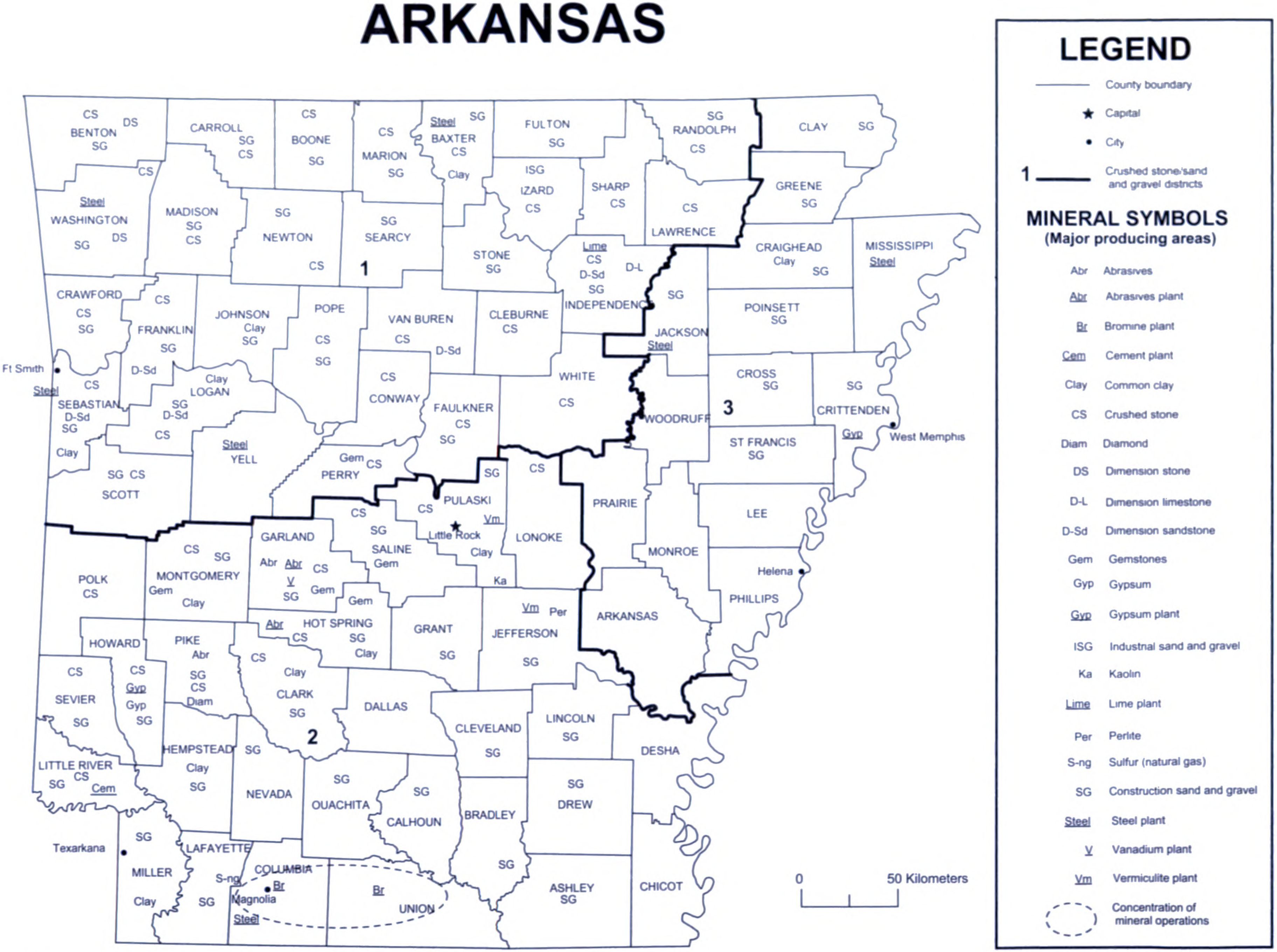
2/ Includes plaster and gunite sands.

3/ Includes road and other stabilization (cement and lime).

4/ Less than ½ unit.

5/ Reported and estimated production without a breakdown by end use.

ARKANSAS



Source: Arkansas Geological Commission/U.S. Geological Survey (2001)

THE MINERAL INDUSTRY OF ARKANSAS

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Arkansas Geological Commission for collecting information on all nonfuel minerals.

In 2001, the estimated value[1] of nonfuel mineral production for Arkansas was $491 million, based upon preliminary U.S. Geological Survey (USGS) data. This was about a 1% increase from that of 2000[2] and followed a 2.6% decrease from 1999 to 2000. The State remained 30th in rank among the 50 States in total nonfuel mineral production value, of which Arkansas accounted for more than 1% of the U.S. total.

In 2001, bromine remained, by value, Arkansas' leading nonfuel mineral, followed by crushed stone with 33% of the State's nonfuel mineral value and cement (portland and masonry). Bromine and cement data must be concealed to protect proprietary company data. Arkansas' increase in value in 2001 resulted mostly from increases in crushed stone and construction sand and gravel, whereas decreases in bromine and cement values lowered the overall net gain for the year. In 2000, decreases in crushed stone, bromine, and construction sand and gravel (in descending order of change) accounted for most of the drop in value from the year previous (table 1). The most significant increases occurred in gypsum, up about $5 million, and silica stone. Increases of less than $1 million also occurred in dimension stone and gemstones.

Based upon USGS estimates of quantities produced during 2001, Arkansas continued to be the leading bromine-producing State, accounting for most U.S. production. Michigan was the only other State that produced bromine. Mining operations in both States extracted subsurface, bromine-rich natural brines by submersible pump for subsequent processing. Arkansas also remained first of two States that produce silica stone and third of four tripoli-producing States. While it continued to be 10th in common clays, the State changed in rank to 8th from 6th in gemstones and to 9th from 8th in gypsum. Additionally, significant quantities of cement, construction sand and gravel, crushed stone, dimension stone, and industrial sand and gravel were produced in the State. The State's metal production, mostly that of raw steel, resulted from materials received from other domestic and foreign sources.

The Arkansas Geological Commission[3] (AGC) provided the following narrative information. No bauxite was mined in Arkansas in 2001. Alcoa Inc. completed its 7th year of a 20-year project of land reclamation adjacent to the community of Bauxite in Saline County. Umecto, Inc. initiated reclamation of the Wilson Springs mines area in Garland County in 1997 and continued this effort. Strategic Minerals Corp. continued operation of the mill facility at Potash Sulphur Springs, based on out-of-State vanadium-bearing feed.

In 2001, Albemarle Corp. and Great Lakes Chemical Co. operated their several bromine extraction and product production plants in Columbia and Union Counties, respectively.

Ash Grove Cement Co., sole producer of cement in the State, operated the Foreman plant in Little River County, using chalk from the Annona Formation and silica from the Marlbrook Formation (both Cretaceous).

In 2001, Star Resources Corp. of Houston, TX, ran a bulk tonnage test from its Black Lick diamond property, northeast of the Crater of Diamonds State Park in Pike County. No results were released on recovered diamond values, and the plant and properties appear inactive.

Arkhola Sand and Gravel Co. continued exploration for additional quarry sites in the western portion of the Arkansas River Valley. Arkhola was developing its second quarry near Jenny Lind in Sebastian County. Arkhola was producing asphalt mix at the Preston Quarry near Van Buren in Crawford County. Bennett Brothers Stone Co., Inc. obtained building stone materials from deposits in Garland and adjacent counties. Bobby Plant Asphalt Co., based in Murfreesboro, Pike County, produced from its quarry in the Jackfork Sandstone (Pennsylvanian) south of Kirby in central Pike County.

Duffield Stone and Gravel Co. operated two quarries in Pope County; one in the upper Atoka Formation (Pennsylvanian) at Russellville, and the Gumlog Quarry, also in the upper Atoka. The company continued to explore the Arkansas River Valley. McClinton-Anchor, Inc., explored for new aggregate quarry sites in the limestone-bearing region of northwest Arkansas. Pyramid Co. produced aggregate from the Atoka Formation south of Damascus in Faulkner County.

Granite Mountain Quarries, Inc. (GMQ) produced aggregate from nepheline syenite at two quarries in Pulaski County. It continued development work for a new syenite aggregate quarry, known as Granite Mountain No. 3 Quarry, near Bryant in Saline County, and began sales of aggregate from its site in late 2001. GMQ also started a new quarry operation northwest of DeQueen, Sevier County, in the Jackfork Sandstone (Pennsylvanian) and continued development efforts of a quarry site in southern Scott County in the Atoka Sandstone (Pennsylvanian). Martin Marietta Co. was actively quarrying the Hatton Tuff Lentil of the Stanley Group (Mississippian) at the Hatton Quarry in southern Polk County. It continued operations at the 270 Quarry near Magnet Cove in Hot Spring County, producing from the hornfels alteration zone in the Stanley Group adjacent to the Cretaceous igneous intrusion.

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[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2001 USGS mineral production data published in this chapter are preliminary estimates as of August 2002 and are expected to change. For some mineral commodities, such as construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Specialist contact information may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals/contacts/comdir.html; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2] Values, percentage calculations, and rankings for 2000 may differ from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also change.

[3] J. Michael Howard, Geology Supervisor, authored the text of the State mineral industry information provided by the Arkansas Geological Commission.

Minnesota Mining and Manufacturing Co. mined nepheline syenite from its Big Rock Arch Street Quarry to supply its roofing granule plant in Sweet Home, Pulaski County. Martin Marietta continued concurrent mining of dike rock for aggregate in this quarry.

Rogers Group Inc. continued exploration on a quarry site at Beryl in Faulkner County. The company continued operations at its Greenbriar Quarry in Faulkner County (sandstone) and its Lowell Quarry in southern Benton County (limestone), producing aggregate. Schwartz Stone Co. quarried sandstone from the Hartshorne Sandstone (Pennsylvanian) for aggregate and dimension stone north of Midway in Logan County. The Souter Construction Co. produced riprap from the Hollywood Quarry in Clark County. Texas Industries Group continued evaluation of tuff deposits from leased property in southern Polk County.

Vulcan Materials Co., based in Birmingham, AL, produced aggregate from its upper Morrowan Sandstone operation at Judsonia in White County. It also produced dolomitic limestone from Lower Ordovician rocks near Black Rock in Lawrence County. Vulcan continued to produce aggregate from the L&R Quarry in the middle part of the Atoka Sandstone near Floyd in White County. Vulcan continued aggregate exploration, focusing on Morrowan and Atokan sandstones in White and Cleburne Counties. Charles Weaver Co. produced crushed aggregate from its quarry in the middle part of the Atoka Formation near El Paso in White County.

The James Hardie Gypsum Co. continued to be the world's largest wallboard manufacturing plant, with an annual capacity of 130 million square meters. The production plant was located near its mines near Nashville in Howard County. The plant and mine employed about 275 people. Principal markets for the wallboard were in the eastern half of the United States. Product was shipped by railcar and truck. C. W. Harrison Gypsum Co. of Oklahoma was inactive in 2001 on its properties in Pike County, but continued reclamation efforts begun in 1999.

The Butterfield Quarry in Hot Spring County was managed and operated by Mark Wallis Whetstones for high-silica novaculite. Shipments in 2001 were sporadic. The company also continued sporadic operation of a whetstone grade mine south of Lonsdale near the Saline-Hot Spring County line. The Rogers Group continued evaluation of high-silica novaculite for ferrosilicon and the silicon markets at a site near Glen Rose in Hot Spring County. The company acquired this deposit from Martin Marietta Co. in 2000.

There were approximately 89 active sand and gravel operations in Arkansas in 2000, the greatest number of these being in the southeastern one-half of the State (the Gulf Coastal Plain). For 2001, 17 new sand and gravel permits were issued by the Surface Mining and Reclamation Division of the Arkansas Department of Environmental Quality (ADEQ). The permits were issued to Arkansas Decorative Stone LLC; Asphalt Concrete Products; B & B Gravel; B & B Materials; BB & B Construction Co.; Brian Hoskins Construction; Carter Sand and Gravel; Garland Sand and Gravel Corp.; Glacial Sand and Gravel; Mike Blann Gravel Co., Inc.; Mountain Home Concrete; North Arkansas Sand and Gravel; R.L. Drum Sand and Gravel; S & K Dirtworks; Sheridan Excavating; Smith's Backhoe/Dozer Service, LLC; and Teague Farms. Eight Notifications of Intent to Quarry were received by ADEQ: Benton County Stone Co., Inc. in Benton County; Dan's Whetstone Co., Inc. in Garland County; Delta Asphalt in Lawrence County; Edwards Brothers, Inc. in Sharp County; Pine Bluff Sand and Gravel in Logan County; Rogers Group, Inc. in Conway County; Malvern Minerals Co. in Garland County; and McGeorge Contracting Co., Inc. in Sevier County. All eight were issued Authorizations to Quarry; however, Benton County Stone Co., Inc. appealed the denial of the county's large-scale operation and had not begun to quarry the site.

The AGC web site (www.state.ar.us/agc/agc.htm) hosted approximately 47,500 visitors during 2001 during its third year online. This was a 79% increase in Web site use relative to 2000. Information posted on the Web pages included resource data, USGS annual nonfuel raw mineral production, publications and ordering information, stratigraphic and geologic data concerning Arkansas, Arkansas Board of Registration for Professional Geologist, agency services, and news items. The AGC links page provides a link listing for State Geological Surveys, along with many Federal and Arkansas government links. There is also an extensive listing of links to geology Web sites, organizations, and universities.

Initiated by AGC staff in 2001 is a spreadsheet database designed to contain all known sites of mineral extraction in the State, excluding petroleum and natural gas. Some 5,000 records have been entered into the database. In 2002, in cooperation with the USGS under the STATEMAP component of the USGS National Cooperative Geologic Mapping Program, three digitized geologic maps based on 7.5-minute USGS topographic maps were completed. Additionally, staff geologists completed the digitization of four geologic maps based on USGS 7.5-minute topographic maps in Pulaski County.

Operators of 24 quartz contracts with the U.S. Forest Service on the Ouachita National Forest in Arkansas generated around $19,000 in revenue. The U.S. Bureau of Land Management received about $3,300 in revenue on quartz. About 40 metric tons of quartz was removed from quartz mines in the Ouachita National Forest.

In 2001, the Arkansas General Assembly passed legislation that amended the Arkansas Open-Cut Land Reclamation Act. The legislation made changes primarily in the areas of the amount of civil penalty that a court or ADEQ could assess for violations of the act, changes to the permit application fee, and changes in the size of buffer zones. The Arkansas Pollution Control and Ecology Commission initiated rulemaking on December 7, 2001, to amend Regulation No. 15, the Arkansas

Open-Cut Mining and Land Reclamation Code, to reflect legislative changes made from 1999 to 2001.

There were 176 active, permitted, or authorized noncoal mine sites in Arkansas during 2001. ADEQ held reclamation bonds on approximately 3,040 hectares of land permitted or authorized for noncoal mining and released a total of 44 hectares from reclamation bond liability.

TABLE 1

NONFUEL RAW MINERAL PRODUCTION IN ARKANSAS 1/ 2/

(Thousand metric tons and thousand dollars)

	1999		2000		2001 p/	
Mineral	Quantity	Value	Quantity	Value	Quantity	Value
Clays, common	1,010	1,510	958	1,170	958	1,170
Gemstones	NA	731	NA	925	NA	675
Sand and gravel, construction	11,300	53,200	9,820	48,600	10,700	53,800
Stone, crushed	30,700	145,000	28,300	137,000	33,000	165,000
Combined values of bromine, cement, clays (kaolin), gypsum (crude), lime, sand and gravel (industrial), silica stone 3/ (1999-2000), stone (dimension limestone, marble, sandstone), tripoli	XX	296,000	XX	296,000	XX	271,000
Total	XX	497,000	XX	484,000	XX	491,000

p/ Preliminary. NA Not available. XX Not applicable.

1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/ Data are rounded to no more than three significant digits; may not add to totals shown.

3/ Grindstones, pulpstones, and sharpening stones; excludes mill liners and grinding pebbles.

TABLE 2

ARKANSAS: CRUSHED STONE SOLD OR USED, BY KIND 1/

	1999				2000			
Kind	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone	24 r/	8,170 r/	$36,600 r/	$4.48 r/	24	8,660	$37,800	$4.37
Dolomite	2	W	W	4.83	2	W	W	5.02
Granite	6	12,500	58,200	4.66	6	10,200	53,400	5.21
Sandstone	22 r/	6,060 r/	30,300 r/	4.99 r/	19	5,740	28,000	4.87
Quartzite and quartz	7	W	W	5.21	7	W	W	4.68
Miscellaneous stone	13	W	W	5.99	10	W	W	5.14
Total or average	XX	30,700	145,000	4.73	XX	28,300	137,000	4.84

r/ Revised. W Withheld to avoid disclosing company proprietary data, included in "Total." XX Not applicable.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 3
ARKANSAS: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+1 1/2 inch):			
Riprap and jetty stone	115	$581	$5.05
Filter stone	42	167	3.98
Other coarse aggregate	148	928	6.27
Total or average	305	1,680	5.50
Coarse aggregate, graded:			
Concrete aggregate, coarse	338	1,510	4.45
Bituminous aggregate, coarse	293	1,390	4.74
Bituminous surface-treatment aggregate	W	W	5.66
Railroad ballast	W	W	4.85
Other graded coarse aggregate	1,300	8,150	6.27
Total or average	1,930	11,000	5.72
Fine aggregate (-3/8 inch):			
Stone sand, concrete	W	W	3.58
Stone sand, bituminous mix or seal	W	W	3.45
Screening, undesignated	W	W	3.41
Other fine aggregate	343	1,710	5.00
Total or average	343	1,710	5.00
Coarse and fine aggregates:			
Graded road base or subbase	1,510	7,130	4.72
Unpaved road surfacing	72	271	3.76
Crusher run or fill or waste	89	346	3.89
Roofing granules	W	W	6.38
Other coarse and fine aggregates	4,640	27,700	5.96
Total or average	6,320	35,400	5.61
Other construction materials	62	219	3.53
Agricultural:			
Agricultural limestone	137	634	4.63
Poultry grit and mineral food	W	W	3.84
Other agricultural uses	113	483	4.27
Chemical and metallurgical:			
Cement manufacture	(3/)	(3/)	2.57
Lime manufacture	(3/)	(3/)	3.87
Special:			
Asphalt fillers or extenders	(3/)	(3/)	4.71
Other fillers or extenders	(3/)	(3/)	6.36
Other miscellaneous uses:			
Abrasives	(3/)	(3/)	2.00
Acid neutralization	(3/)	(3/)	3.65
Other specified uses not listed	(3/)	(3/)	12.00
Unspecified: 4/			
Reported	11,300	51,600	4.58
Estimated	6,100	29,000	4.76
Total or average	17,300	80,400	4.64
Grand total or average	28,300	137,000	4.84

W Withheld to avoid disclosing company proprietary data, included with "Other."

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Includes dolomite, granite, limestone, miscellaneous stone, quartz, quartzite, and sandstone.

3/ Withheld to avoid disclosing company proprietary data, included in "Grand total."

4/ Reported and estimated production without a breakdown by end use.

TABLE 4
ARKANSAS: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE AND DISTRICT 1/ 2/

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1 ½ inch) 3/	253	1,480	W	W	W	W
Coarse aggregate, graded 4/	W	W	--	--	W	W
Fine aggregate (-3/8 inch) 5/	283	1,350	W	W	W	W
Coarse and fine aggregate 6/	2,640	12,100	W	W	--	--
Other construction materials	52	186	10	33	--	--
Agricultural 7/	251	1,120	--	--	--	--
Chemical and metallurgical 8/	W	W	W	W	--	--
Special 9/	W	W	W	W	--	--
Other miscellaneous uses 10/	W	W	W	W	--	--
Unspecified: 11/						
Reported	6,160	28,400	5,100	23,200	--	--
Estimated	1,100	5,000	4,900	24,000	--	--
Total	13,000	62,000	15,300	74,600	57	641

W Withheld to avoid disclosing company proprietary data, included in "Total." -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes dolomite, granite, limestone, miscellaneous stone, quartz, quartzite, and sandstone.

3/ Includes riprap and jetty stone and other coarse aggregate.

4/ Includes bituminous aggregate (coarse), bituminous surface treatment aggregate, concrete aggregate (coarse), railroad ballast, and other graded coarse aggregate.

5/ Includes stone sand (bituminous mix or seal), stone sand (concrete), screening (undesignated), and other fine aggregate.

6/ Includes crusher run (select material or fill), graded road base or subbase, roofing granules, unpaved road surfacing, and other coarse and fine aggregates.

7/ Includes agricultural limestone, poultry grit and mineral food, and other agricultural uses.

8/ Includes cement manufacture and lime manufacture.

9/ Includes asphalt fillers or extenders and other fillers or extenders.

10/ Includes abrasives and acid neutralization.

11/ Reported and estimated production without a breakdown by end use.

TABLE 5
ARKANSAS: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate and concrete products 2/	4,430	$24,600	$5.55
Asphaltic concrete aggregates and other bituminous mixtures	470	3,470	7.39
Road base and coverings 3/	390	1,280	3.28
Fill	66	247	3.74
Other miscellaneous uses 4/	262	1,070	4.09
Unspecified: 5/			
Reported	2,640	10,900	4.11
Estimated	1,600	7,100	4.55
Total or average	9,820	48,600	4.95

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes plaster and gunite sands.

3/ Includes road and other stabilization (lime).

4/ Includes filtration and snow and ice control.

5/ Reported and estimated production without a breakdown by end use.

TABLE 6
ARKANSAS: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products 2/	424	2,770	3,180	17,100	827	4,670
Asphaltic concrete aggregates and other bituminous mixtures	--	--	222	1,230	248	2,250
Road base and coverings 3/	90	436	W	W	W	W
Fill	47	220	W	W	W	W
Other miscellaneous uses 4/	51	305	468	1,420	61	214
Unspecified: 5/						
Reported	1,270	4,220	474	2,280	898	4,360
Estimated	420	1,900	760	3,400	380	1,800
Total	2,310	9,860	5,100	25,500	2,410	13,300

W Withheld to avoid disclosing company proprietary data, included with "Other miscellaneous uses." -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes plaster and gunite sands.

3/ Includes road and other stabilization (lime).

4/ Includes filtration and snow and ice control.

5/ Reported and estimated production without a breakdown by end use.

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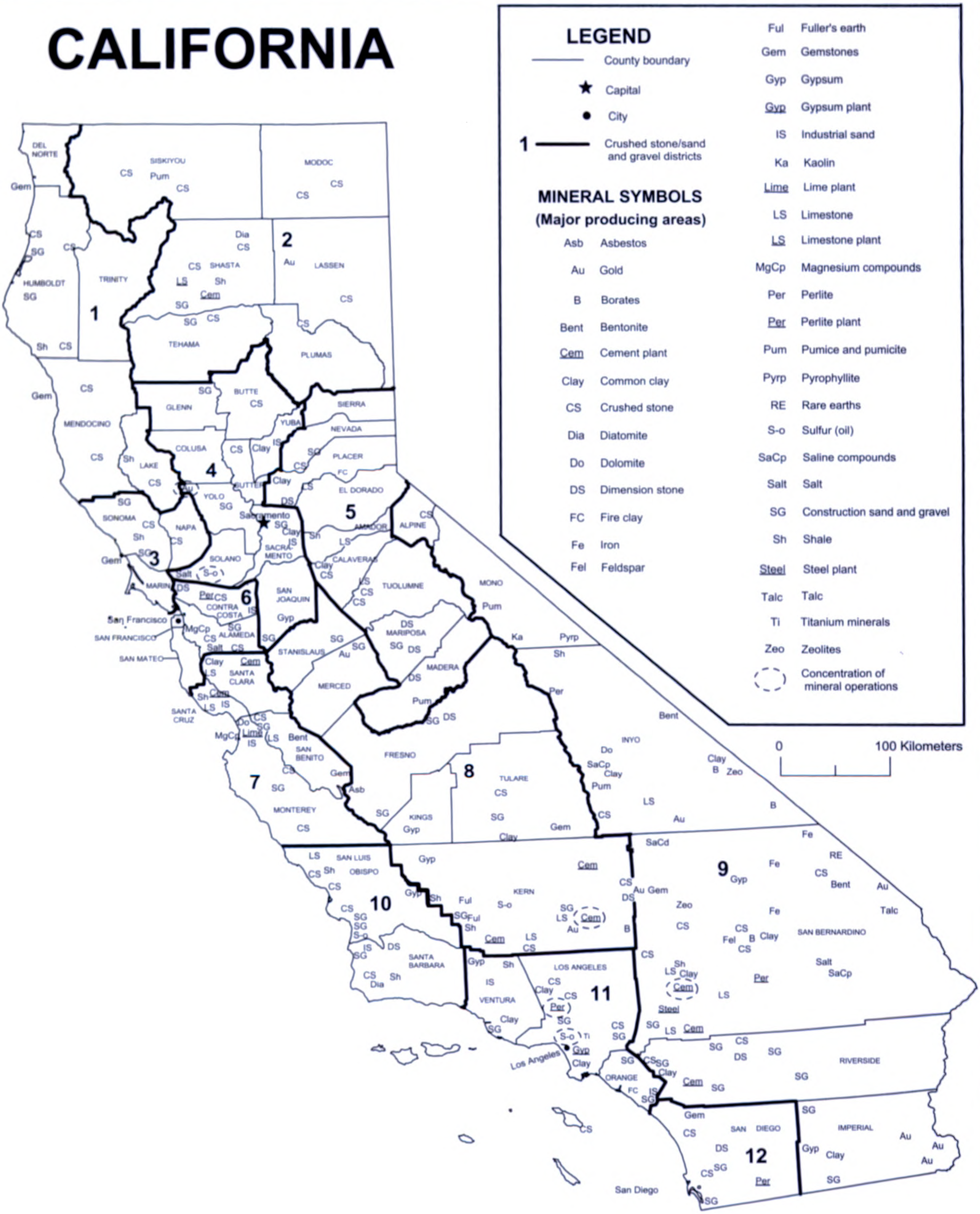

Source: California Department of Conservation, California Geological Survey/U.S. Geological Survey (2001)

THE MINERAL INDUSTRY OF CALIFORNIA

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the California Geological Survey for collecting information on all nonfuel minerals.

In 2001, the estimated value[1] of nonfuel mineral production for California was $3.25 billion, based upon preliminary U.S. Geological Survey (USGS) data. This was less than an 1% decrease from that of 2000[2] and followed a 2.3% decrease in 2000 from 1999. The State continued to lead the Nation in total nonfuel mineral production value, of which California accounted for more than 8% of the U.S. total.

Industrial minerals accounted for about 95% of California's nonfuel mineral value; the remaining value resulted from the mining of gold and silver. California continued in 2001 as the top construction sand and gravel-producing State, accounting for more than 13% of the commodity's total U.S. mine production, and more than 17% of the Nation's total value for that commodity. Construction sand and gravel was, by value, also the State's leading nonfuel mineral, accounting for more than 29% of the State's total nonfuel mineral production value. Cement (portland and masonry) was the second leading nonfuel mineral, followed by boron minerals and crushed stone; these top four altogether totaled nearly 84% of the State's total industrial mineral value. In 2001, these four mineral commodities had the most influence on the State's nonfuel mineral economy for the year. Increases in the values of crushed stone and construction sand and gravel were smaller than the decreases that occurred in portland cement and gold, resulting in a net decrease for the year (table 1).

In 2000, the most significant increases occurred in construction sand and gravel, up $43 million; rare-earth metal concentrates; masonry cement, up $4.8 million; portland cement, up $4 million; and common clays, up $3.7 million. Increases within the range of $1 million to $2 million occurred in gypsum, industrial sand and gravel, and pumice and pumicite (in descending order of change). But these were more than balanced out by the decreases in the values of boron minerals, down $73 million; gold, down $37 million; salt and crushed stone, down about $11 million each; magnesium compounds; and fuller's earth, down about $6 million. Smaller decreases of about $2 million each occurred in soda ash, feldspar, and diatomite. All other changes in value were on the order of $1 million or less (table 1).

Based upon USGS estimates of the quantities produced in the United States during 2001, California continued as the Nation's only State to produce boron, rare-earth metal concentrates, and asbestos (in descending order of value). The State remained first in the production of construction sand and gravel and first among four States that produced diatomite; second among three States that produced soda ash; second in pumice and pumicite and second of two pyrophyllite-producing States; third in gemstones; fourth in fire clays; fifth in magnesium compounds and perlite; sixth in fuller's earth; and ninth in common clays. While California rose in rank to 1st from 2d in masonry cement, to 2d from 3d in feldspar, to 9th from 10th in salt, and to 10th from 11th in crushed stone, it decreased from 1st to 2d in portland cement, from 3d to 4th in gold and in industrial sand and gravel, from 4th to 5th in kaolin, and from 6th to 7th in gypsum. Additionally, significant quantities of dimension stone were produced in the State.

The following narrative information was provided by the California Geological Survey (CGS).[3] There were about 1,000 active mines producing nonfuel minerals in the State. Approximately 9,300 people were employed at these mines and their processing plants.

After 75 years of operation, Hansen Aggregates Mid Pacific, Inc.'s Radum operation in the Pleasanton area (Alameda County) ceased mining in late November 2001. The operation was the largest alluvial sand and gravel producer in northern California with an annual production of about 4 million metric tons (Mt). The Radum Mine and plant produced roughly 25% of the aggregate used in the south San Francisco Bay area. Hansen Aggregates made up a portion of the deficit by shipping aggregate almost 1,000 nautical miles from British Columbia to the San Francisco Bay area. Self-unloading bulk cargo deep-draft vessels hauling up to 64,000 metric tons (t) of aggregate began delivering aggregate in late 2000 after the Port of San Francisco and Hanson Aggregates entered into a 5-year contract to develop a bulk-cargo shipping terminal at the Port's Pier 94.

In addition to the San Francisco Bay area, bulk cargo ships have transported aggregate from British Columbia to San Diego and Long Beach.

The Shasta County Planning Commission approved a permit that would allow expansion for Lehigh Southwest Cement Co.'s (formerly Calaveras Cement Co.) Gray Rock limestone quarry in Shasta County in December 2001. The updated permit allowed for an additional 44 Mt of high-quality limestone to be mined during a 50-year period from the existing site that has operated since 1960.

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[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2001 USGS mineral production data published in this chapter are preliminary estimates as of August 2002 and are expected to change. For some mineral commodities, such as construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Specialist contact information may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals/contacts/comdir.html; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2] Values, percentage calculations, and rankings for 2000 may differ from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also change.

[3] Susan Kohler, Associate Geologist, authored the text of the State mineral industry information provided by the California Geological Survey.

Teichert Aggregates (owned by Teichert Inc.) submitted the final Environmental Impact Report for its Lincoln project, a 290-hectare aggregate site located about 6 kilometers north of the town of Lincoln (Placer County). The project called for the extraction of 34 Mt of construction alluvial sand and gravel and 111 Mt of crushed granite aggregate during a period of 85 years.

Mining commenced in March 2001 at Calaveras Material Inc.'s Woolstenhulme Ranch sand and gravel mine (Merced County). Approximately 14 Mt of aggregate will be mined at the site during a period of about 25 to 30 years. The material will be processed at Calaveras Materials Inc.'s River Rock plant near Snelling (Merced County).

Molycorp Inc. continued its permitting process for an enlargement of the current pit and an onsite tailings pond for its Mountain Pass rare-earths mine (San Bernardino County). Prior to closure of its refining facility in 1998, Molycorp recovered the rare earths cerium, europium, gadolinium, lanthanum, neodymium, praseodymium, and samarium from bastnasite ore mined at its Mountain Pass Mine. In 2000, Molycorp was permitted to mine bastnasite ore, but processing was limited to the recovery of raw and leached bastnasite. The recovery of rare-earths at the separation plant was contingent on the completion of a new onsite tailings impoundment and evaporation pond. Molycorp anticipated having permits for the remodeled processing facility by the end of 2002 and planned to be back in full production by 2004. The Mountain Pass Mine was the only producer of rare-earths in the United States.

Teichert Materials (owned by Teichert Inc.) acquired two mine properties in September 2001, the American River Aggregates property in Sacramento County and the Cool Cave Quarry in El Dorado County. The American River Aggregates property will be renamed as two separate facilities: Teichert Grantline Plant and Teichert Prairie City Sand Plant. The Cool Cave Quarry was purchased from Spreckles Limestone Products, which mined high-quality limestone to supply lime for its sugar plants in Woodland (Yolo County) and Tracy (San Joaquin County). Base rock and riprap were also produced at the quarry. Teichert Materials planned to continue aggregate production at the quarry and also to pursue other markets for the high-grade limestone.

CEMEX, Inc.'s Victorville cement plant (San Bernardino County) completed a 900,000-metric-ton-per-year plant expansion, increasing the plant capacity to 2.9 million metric tons per year.

The CGS reported gold production continued to decline during the year with a total of 14 t produced at a total value of $122 million. The USGS preliminary figure from table 1 was somewhat higher at 15 t valued at $137 million. In the next 2 to 3 years, the CGS expects California's gold production to continue to drop.

Silver production made up less than 1% of the total value of California's metal production. All of the silver produced in California is a byproduct of gold production. Iron was produced and used in the production of portland cement and was included in the industrial mineral category.

Homestake's McLaughlin Mine (Napa, Lake, and Yolo Counties) ranked number one in California gold production in 2001. The McLaughlin Mine has been operating since 1985 and was California's largest producer of gold from 1985 to 1995. Mining operations ceased at the McLaughlin Mine in 1996, but gold processing was expected to continue through May 2002. Barrick Gold Corp. acquired Homestake Mining Co. for $2.2 billion in December 2001.

Canyon Resources Corp.'s Briggs Mine (Inyo County) was the second largest gold producer in the State in 2001. Newmont's Mesquite Mine (Imperial County), which ranked number one in gold production from 1996 through 2000, ranked number three in 2001. Although the Mesquite Mine ceased mining in the fall of 2000, leaching of gold was expected to continue into 2003.

California's fourth largest gold producer, Viceroy Gold's and MK Gold's Castle Mountain Mine (San Bernardino County) ceased mining in May 2001. The mine produced about 36 t of gold during its 10 years of operation. Heap leaching will continue at the mine until 2003 or 2004, and reclamation was expected to be completed by 2004.

Initially, the Federal Government denied Glamis Gold Ltd.'s Imperial gold project (Imperial County) in January 2001, but the denial was later rescinded in October 2001, allowing Glamis to continue the permitting process. Glamis Gold Ltd. commenced final reclamation on its heap-leaching facility at the Picacho Mine (Imperial County), and final reclamation was completed in March 2002. The historic Picacho Mine had been reopened as an open pit heap-leach operation by Glamis Gold in 1981 and was mined up until 1998. Gold production ceased in 2000. Glamis Gold produced 10.5 t of gold from the Picacho Mine during its 20 years of operation.

Lassen Gold Mining Inc. completed heap leaching in September 2001 at its Hayden Hill gold mine (Lassen County). Mining ceased at the mine in December 1997. The mine produced more than 15.6 t of gold since production began in 1992.

An amendment (adopted in July 2000) by the California Air Resources Board (CARB) prohibited the sale or use of aggregate derived from serpentinite or ultramafic rock for unpaved roads unless it has been tested and found to have an asbestos content that is less than 0.25%. The amendment went into effect on November 13, 2001.

In January 2002, the name of the Division of Mines and Geology was changed to the California Geological Survey (CGS). CGS comprised several programs including Mineral Resources and Mineral Hazards Mapping, Seismic Hazards Mapping, Strong Motion Instrumentation, Regional Geologic and Hazards Mapping, Timber Harvest Enforcement and Watershed Restoration, and North Coast Watershed Assessment. Consequently, the new name change better reflects the diverse geologic activities conducted by CGS.

The Department of Conservation's CGS Mineral Land Classification Project, a mandate of the Surface Mining and Reclamation Act, continued to provide lead agencies with mineral resource maps that have proved to be of great value in land-use planning and mineral resource conservation. In 2001, CGS completed a Mineral Land Classification report in Lassen County and had ongoing projects in Solano, Napa, Sonoma, Marin, San Bernardino, and Riverside Counties. CGS has classified a little more than one-third of the State for mineral resources.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN CALIFORNIA 1/ 2/

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral		1999 Quantity	1999 Value	2000 Quantity	2000 Value	2001 p/ Quantity	2001 p/ Value
Asbestos	metric tons	7,190	W	5,260	W	5,440	W
Boron minerals		1,220	630,000	1,070	557,000	1,070	557,000
Cement:							
Masonry		466	38,300 e/	484	43,100 e/	560 e/	49,900 e/
Portland		10,300	817,000 e/	10,900	821,000 e/	10,200 e/	768,000 e/
Clays:							
Bentonite		23	2,110	21	2,160	22	2,090
Common		829	13,100	969	16,800	969	16,800
Gemstones		NA	1,100	NA	1,500	NA	1,240
Gold 3/	kilograms	17,500	192,000	17,200	155,000	15,200	137,000
Rare-earth metal concentrates e/	metric tons	5,000	14,400	5,000	W	W	W
Sand and gravel:							
Construction		145,000	897,000	148,000	940,000	148,000	953,000
Industrial		1,790	43,700	1,810	45,200	1,760	43,900
Silver 3/	metric tons	8	1,290	9	1,390	W	W
Stone:							
Crushed		59,400 r/	384,000 r/	59,700	373,000	61,000	393,000
Dimension	metric tons	29,400	4,930	33,300	5,790	33,000	6,000
Zeolites	do.	(4/)	NA	(4/)	NA	(4/)	NA
Combined values of clays (fire, fuller's earth, kaolin), diatomite, feldspar, gypsum (crude), iron ore [usable (1999)], lime, magnesium compounds, perlite (crude), pumice and pumicite, salt, soda ash, talc [crude (1999)], and values indicated by symbol W		XX	310,000	XX	308,000	XX	321,000
Total		XX	3,350,000	XX	3,270,000	XX	3,250,000

e/ Estimated. p/ Preliminary. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined values" data.
XX Not applicable.
1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).
2/ Data are rounded to no more than three significant digits; may not add to totals shown.
3/ Recoverable content of ores, etc.
4/ Withheld to avoid disclosing company proprietary data.

TABLE 2
CALIFORNIA: CRUSHED STONE SOLD OR USED, BY KIND 1/

Kind	1999 Number of quarries	1999 Quantity (thousand metric tons)	1999 Value (thousands)	1999 Unit value	2000 Number of quarries	2000 Quantity (thousand metric tons)	2000 Value (thousands)	2000 Unit value
Limestone 2/	32 r/	26,300 r/	$147,000 r/	$5.59	30	29,200	$149,000	$5.12
Dolomite	5	356	2,510	7.05	5	256	2,060	8.05
Granite	23 r/	12,300 r/	79,400 r/	6.46 r/	23	10,400	75,100	7.24
Marble	1	W	W	7.00	2	W	W	7.06
Sandstone and quartzite	16 r/	3,240 r/	32,100 r/	9.89 r/	16	3,400	29,300	8.64
Shell	1	W	W	7.74	1	W	W	8.32
Traprock	20 r/	11,600 r/	85,900 r/	7.43 r/	20	10,800	79,000	7.29
Slate	4	W	W	7.92	3	W	W	21.28
Volcanic cinder and scoria	7 r/	182 r/	1,930 r/	10.62 r/	9	185	2,000	10.81
Miscellaneous stone	50 r/	5,070 r/	31,800 r/	6.27 r/	45	5,320	34,500	6.48
Total or average	XX	59,400 r/	384,000 r/	6.46 r/	XX	59,700	373,000	6.26

r/ Revised. W Withheld to avoid disclosing company proprietary data; included in "Total." XX Not applicable.
1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.
2/ Includes limestone-dolomite reported with no distinction between the two.

TABLE 3
CALIFORNIA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+1 1/2 inch):			
Macadam	W	W	$5.64
Riprap and jetty stone	1,860	$18,300	9.83
Filter stone	295	1,430	4.84
Other coarse aggregate	33	369	11.18
Total or average	2,190	20,100	9.17
Coarse aggregate, graded:			
Concrete aggregate, coarse	3,080	25,300	8.22
Bituminous aggregate, coarse	2,340	19,000	8.12
Bituminous surface-treatment aggregate	W	W	12.53
Railroad ballast	602	4,710	7.82
Other graded coarse aggregate	1,850	16,400	8.84
Total or average	7,870	65,300	8.30
Fine aggregate (-3/8 inch):			
Stone sand, concrete	1,150	9,030	7.82
Stone sand, bituminous mix or seal	424	3,620	8.54
Screening, undesignated	936	5,600	5.98
Other fine aggregate	1,080	9,370	8.64
Total or average	3,600	27,600	7.67
Coarse and fine aggregates:			
Graded road base or subbase	4,600	31,000	6.75
Unpaved road surfacing	439	2,260	5.15
Terrazzo and exposed aggregate	38	517	13.61
Crusher run or fill or waste	1,300	7,500	5.78
Roofing granules	W	W	8.78
Other coarse and fine aggregates	1,220	9,570	7.86
Total or average	7,590	50,900	6.71
Other construction materials	811	6,280	7.75
Agricultural:			
Agricultural limestone	57	643	11.28
Poultry grit and mineral food	124	1,770	14.31
Other agricultural uses	15	86	5.73
Total or average	196	2,500	12.77
Chemical and metallurgical:			
Cement manufacture	14,800	67,800	4.57
Lime manufacture	(3/)	(3/)	3.71
Glass manufacture	(3/)	(3/)	18.33
Sulfur oxide removal	(3/)	(3/)	15.00
Special:			
Asphalt fillers or extenders	(3/)	(3/)	5.36
Other fillers or extenders	(3/)	(3/)	5.37
Other miscellaneous uses:			
Flour (slate)	(3/)	(3/)	49.57
Other specified uses not listed	1,200	6,910	5.76
Unspecified: 4/			
Reported	4,290	24,500	5.71
Estimated	17,000	98,000	5.86
Total or average	21,100	123,000	5.83
Grand total or average	59,700	373,000	6.26

W Withheld to avoid disclosing company proprietary data; included with "Other."

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Includes dolomite, granite, limestone, limestone-dolomite, marble, miscellaneous stone, sandstone and quartzite, shell, slate, traprock, and volcanic cinder and scoria.

3/ Withheld to avoid disclosing company proprietary data; included in "Grand total."

4/ Reported and estimated production without a breakdown by end use.

TABLE 4
CALIFORNIA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3		District 4		District 5	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Construction:										
Coarse aggregate (+1 1/2 inch) 2/	W	W	W	W	341	4,930	557	6,010	92	565
Coarse aggregate, graded 3/	W	W	W	W	W	W	W	W	W	W
Fine aggregate (-3/8 inch) 4/	W	W	W	W	W	W	W	W	W	W
Coarse and fine aggregate 5/	278	1,280	W	W	1,000	6,160	W	W	300	1,420
Other construction materials	64	230	--	--	11	118	354	3,430	32	122
Agricultural 6/	--	--	W	W	--	--	--	--	--	--
Chemical and metallurgical 7/	W	W	W	W	--	--	--	--	W	W
Special 8/	--	--	--	--	--	--	--	--	W	W
Other miscellaneous uses 9/	--	--	--	--	W	W	--	--	--	--
Unspecified: 10/										
Reported	(11/)	(11/)	44	248	--	--	62	306	293	1,720
Estimated	100	640	210	1,100	1,100	6,500	24	140	760	4,400
Total	511	2,860	1,630	6,250	3,300	26,300	3,600	29,400	1,580	9,890

Use	District 6		District 7		District 8		District 9		District 10	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Construction:										
Coarse aggregate (+1 1/2 inch) 2/	W	W	90	1,380	W	W	100	527	21	360
Coarse aggregate, graded 3/	W	W	3,320	25,800	W	W	W	W	W	W
Fine aggregate (-3/8 inch) 4/	W	W	1,490	12,300	--	--	W	W	W	W
Coarse and fine aggregate 5/	1,410	9,610	2,010	16,000	--	--	335	1,900	W	W
Other construction materials	26	149	233	1,250	--	--	72	891	19	99
Agricultural 6/	W	W	W	W	--	--	W	W	W	W
Chemical and metallurgical 7/	--	--	W	W	W	W	W	W	W	W
Special 8/	--	--	--	--	--	--	W	W	--	--
Other miscellaneous uses 9/	272	1,280	--	--	W	W	927	5,620	--	--
Unspecified: 10/										
Reported	291	1,690	856	4,960	(11/)	(11/)	1,400	8,100	173	1,000
Estimated	--	--	3,800	23,000	4,400	25,000	5,500	32,000	--	--
Total	3,570	27,300	14,900	99,400	6,800	39,800	18,000	93,500	590	5,930

Use	District 11		District 12		Unspecified districts	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1 1/2 inch) 2/	W	W	W	W	--	--
Coarse aggregate, graded 3/	W	W	W	W	--	--
Fine aggregate (-3/8 inch) 4/	W	W	W	W	--	--
Coarse and fine aggregate 5/	W	W	W	W	--	--
Other construction materials	--	--	--	--	--	--
Agricultural 6/	W	W	--	--	--	--
Chemical and metallurgical 7/	W	W	--	--	--	--
Special 8/	W	W	--	--	--	--
Other miscellaneous uses 9/	--	--	--	--	--	--
Unspecified: 10/						
Reported	1,170	6,440	--	--	4	23
Estimated	290	1,700	630	3,600	--	--
Total	2,970	18,400	2,160	14,200	4	23

See footnotes at end of table.

TABLE 4--Continued
CALIFORNIA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE AND DISTRICT 1/

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes filter stone, macadam, riprap and jetty stone, and other coarse aggregate.

3/ Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), railroad ballast, and other graded coarse aggregate.

4/ Includes screening (undesignated), stone sand (bituminous mix or seal), stone sand (concrete), and other fine aggregate.

5/ Includes crusher run (select material or fill), graded road base or subbase, roofing granules, terrazzo and exposed aggregate, unpaved road surfacing, and other coarse and fine aggregates.

6/ Includes agricultural limestone, poultry grit and mineral food, and other agricultural uses.

7/ Includes cement manufacture, glass manufacture, lime manufacture, and sulfur oxide removal.

8/ Includes asphalt fillers or extenders and other fillers or extenders.

9/ Includes flour (slate) and other specified uses not listed.

10/ Reported and estimated production without a breakdown by end use.

11/ Less than ½ unit.

TABLE 5
CALIFORNIA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	49,000	$337,000	$6.75
Plaster and gunite sands	4,220	25,900	6.14
Concrete products (blocks, bricks, pipe, decorative, etc.)	1,030	8,410	8.17
Asphaltic concrete aggregates and other bituminous mixtures	21,300	148,000	6.95
Road base and coverings	17,400	96,900	5.57
Road stabilization (cement and lime)	173	1,480	8.55
Fill	6,870	36,200	5.27
Snow and ice control	62	546	8.81
Railroad ballast	214	1,440	6.73
Other miscellaneous uses	2,500	18,500	7.40
Unspecified: 2/			
Reported	26,000	142,000	5.46
Estimated	19,000	120,000	6.70
Total or average	148,000	940,000	6.34

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Reported and estimated production without a breakdown by end use.

TABLE 6
CALIFORNIA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate (including concrete sand)	331	2,830	316	1,980	727	6,560
Concrete products (blocks, bricks, pipe, decorative, etc.) 2/	W	W	W	W	W	W
Asphaltic concrete aggregates and other bituminous mixtures	401	5,220	288	2,350	W	W
Road base and coverings 3/	417	3,420	756	3,640	W	W
Fill	77	579	109	259	64	519
Other miscellaneous uses 4/	252	606	121	614	1,010	8,500
Unspecified: 5/						
Reported	312	675	(6/)	(6/)	546	5,370
Estimated	460	3,000	880	5,000	160	1,100
Total	2,250	16,300	2,470	13,900	2,500	22,000
	District 4		District 5		District 6	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate (including concrete sand)	8,250	44,300	689	4,710	3,060	29,900
Concrete products (blocks, bricks, pipe, decorative, etc.) 2/	1,820	7,790	W	W	W	W
Asphaltic concrete aggregates and other bituminous mixtures	4,300	22,900	W	W	1,850	17,100
Road base and coverings 3/	6,050	27,300	1,200	8,680	969	7,490
Fill	759	3,000	85	598	1,840	15,500
Other miscellaneous uses 4/	964	4,460	754	5,440	1	10
Unspecified: 5/						
Reported	594	1,430	679	3,460	4,760	29,000
Estimated	5,600	47,000	1,200	7,300	41	250
Total	28,400	158,000	4,570	30,200	12,500	99,300
	District 7		District 8		District 9	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate (including concrete sand)	1,750	14,000	5,320	36,300	8,570	43,100
Concrete products (blocks, bricks, pipe, decorative, etc.) 2/	W	W	124	898	211	1,300
Asphaltic concrete aggregates and other bituminous mixtures	W	W	2,820	20,500	3,610	19,400
Road base and coverings 3/	W	W	2,340	14,600	2,240	8,690
Fill	370	2,400	279	1,190	264	615
Other miscellaneous uses 4/	2,380	16,500	426	4,080	181	1,210
Unspecified: 5/						
Reported	672	4,270	--	--	9,440	51,100
Estimated	--	--	1,900	12,000	4,500	26,000
Total	5,170	37,200	13,200	89,700	29,000	152,000
	District 10		District 11		District 12	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate (including concrete sand)	223	705	18,600	133,000	2,100	19,500
Concrete products (blocks, bricks, pipe, decorative, etc.) 2/	W	W	1,240	10,300	W	W
Asphaltic concrete aggregates and other bituminous mixtures	W	W	5,230	40,800	W	W
Road base and coverings 3/	378	2,240	1,200	8,980	1,130	7,510
Fill	117	416	2,050	7,870	857	3,200
Other miscellaneous uses 4/	386	2,270	52	471	1,530	14,000
Unspecified: 5/						
Reported	103	666	881	2,490	6,290	40,400
Estimated	530	3,400	1,600	8,600	1,700	10,000
Total	1,740	9,700	30,800	213,000	13,600	95,100
	Unspecified districts					
	Quantity	Value				
Concrete aggregate (including concrete sand)	--	--				
Concrete products (blocks, bricks, pipe, decorative, etc.) 2/	--	--				
Asphaltic concrete aggregates and other bituminous mixtures	--	--				
Road base and coverings 3/	276	1,220				
Fill	--	--				
Other miscellaneous uses 4/	--	--				
Unspecified: 5/						
Reported	1,730	2,860				
Estimated	--	--				
Total	2,010	4,080				

See footnotes at end of table.

TABLE 6--Continued
CALIFORNIA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY USE AND DISTRICT 1

W Withheld to avoid disclosing company proprietary data; included with "Other miscellaneous uses." -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes plaster and gunite sands.

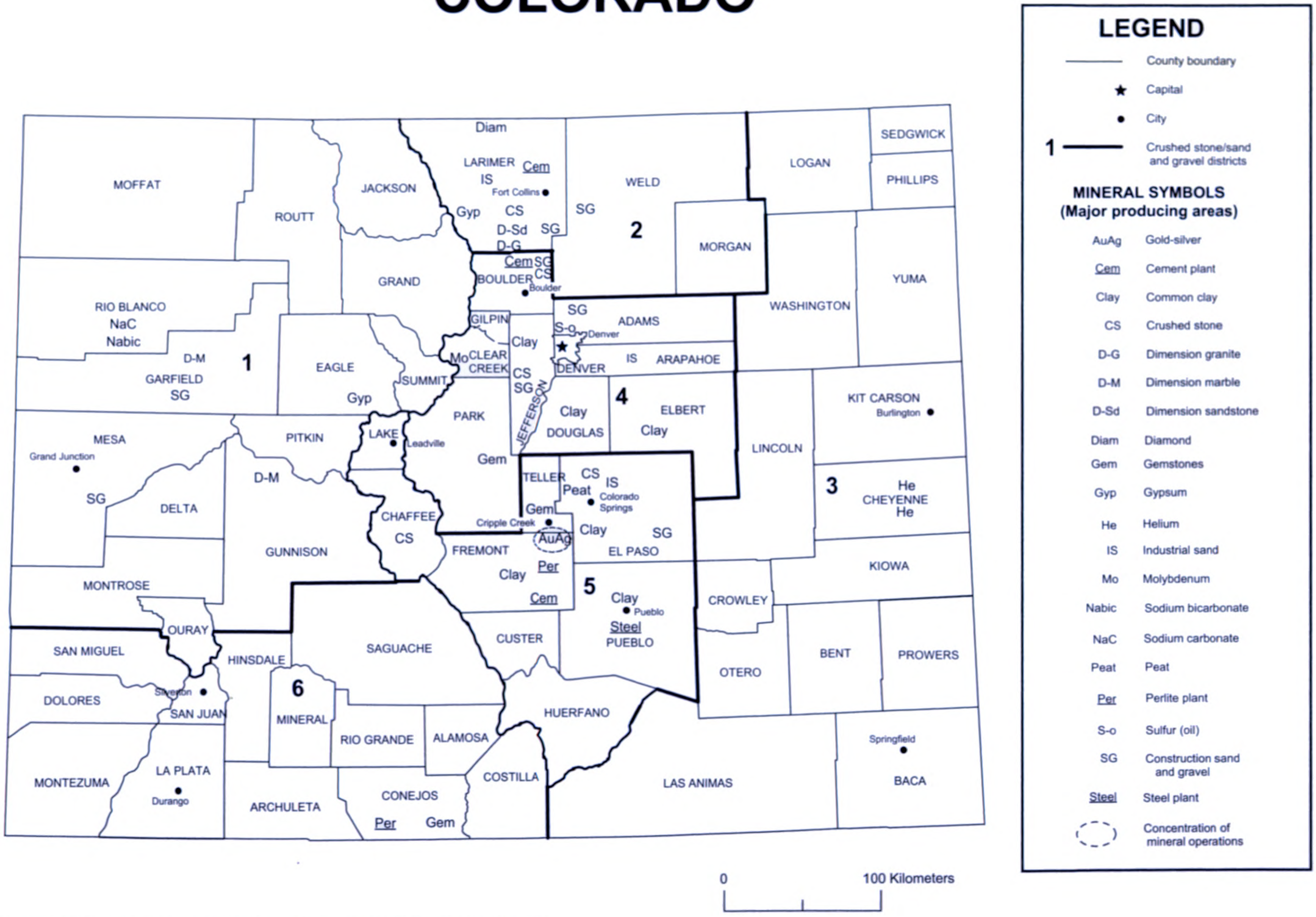
3/ Includes road and other stabilization (cement and lime).

4/ Includes railroad ballast, and snow and ice control.

5/ Reported and estimated production without a breakdown by end use.

6/ Less than 1/2 unit.

COLORADO



Source: Colorado Geological Survey/U.S. Geological Survey (2001)

THE MINERAL INDUSTRY OF COLORADO

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Colorado Geological Survey for collecting information on all nonfuel minerals.

In 2001, the estimated value[1] of nonfuel mineral production for Colorado was $577 million, based upon preliminary U.S. Geological Survey (USGS) data. This was a 2% decrease from that of 2000[2] and followed about a 1% increase from 1999 to 2000. The State increased to 22d (from 26th in 2000) in rank among the 50 States in total nonfuel mineral production value, of which Colorado accounted for about 1.5% of the U.S. total.

Approximately 82% of Colorado's nonfuel mineral production value in 2001 was from the production of industrial minerals, especially construction sand and gravel, portland cement, and crushed stone (in descending order of value), the State's three leading nonfuel mineral commodities. Metals mined in the State included gold, molybdenum, and silver, all of which showed small decreases in mine production and value. In 2001, increases in the values of soda ash (new mining operation) and crushed stone were offset by more substantial decreases that occurred in the values of portland cement, construction sand and gravel, and gold, resulting overall in a decrease for the year.

In 2000, increases of more than $6 million each in crushed stone and portland cement (descending order of change) plus a nearly $5 million increase in the value of gold more than balanced out decreases in the values of molybdenum and Grade-A helium, resulting in a small gain for the year. Relative to these, all other nonfuel minerals showed significantly smaller changes in value that were inconsequential to the net result for the year (table 1).

Compared with USGS estimates of the quantities produced in the other 49 States during 2001, Colorado rose in rank to second from third in molybdenum concentrates, was third in soda ash, increased to sixth from seventh of 11 gold-producing States, and remained fourth in Grade-A helium and sixth in construction sand and gravel. Additionally, the State produced significant quantities of portland cement, crushed stone, gypsum, and gemstones (gemstones based on value).

The following narrative information was provided by the Colorado Geological Survey.[3] The Cripple Creek and Victor Gold Mining Co. (CC&V), a joint venture between AngloGold Ltd. and Golden Cycle Gold Corp., continued to operate the only major precious-metals mine in Colorado. The Cresson Mine in Teller County produced 6,660 kilograms (kg) of gold in 2001, down from the 7,530 kg in 2000. The decrease in metal production was attributable to a lower average ore grade. The mine employed approximately 300 people. The companies planned a major expansion at the mine that will enable gold production to increase to 16,000 kg per year.

The Henderson Mine in Clear Creek County continued to be North America's largest primary producer of molybdenum. The underground mine was owned by Climax Molybdenum Co., a subsidiary of Phelps Dodge Corp. In 2001, the mine and mill produced 5.1 million metric tons of ore containing 8,530 metric tons (t) of molybdenum oxide, down 6% from the 9,070 t produced in 2000. According to the USGS, the 2001 average price for contained molybdenum was $5.20 per kilogram, down from $5.64 per kilogram in 2000 (Blossom, 2002). The operation continued to employ about 320 workers at the mine and mill.

The largest segment of the nonfuel mineral industry in the State was sand, gravel, and crushed stone. Other important industrial minerals and construction materials currently produced in Colorado included cement, clay, decorative stone, dimension stone, gypsum, silica sand, soda ash, and sodium bicarbonate.

In October 2000, American Soda, LLP began production of soda ash and sodium bicarbonate from nahcolite in western Colorado. The company built a state-of-the-art solution mine, 71-kilometer dual pipeline, processing plant, and railroad spur to produce and ship its sodium products. The mine and plant have a nameplate designed production capacity of 730,000 metric tons per year (t/yr) of soda ash and 140,000 t/yr of sodium bicarbonate. In 2001, the first full production year, the company shipped slightly less than one-half of the nameplate capacity of soda ash and sodium bicarbonate.

In 2001, the Yule Quarry in Gunnison County produced 4,479 t of marble valued at approximately $1.2 million. The stone was used by the Veterans Administration for national cemeteries, by other monument fabricators, and by sculptors. A 53-t marble block was cut for a renowned sculptor of Parker, CO. This massive block surpassed the previous record 50-t stone produced in 1931 for the Tomb of the Unknowns in Washington, DC. The owner of the quarry was Sierra Minerals Corp. of Centennial, CO. The quarry employed 13 people. The stone was marketed under the name Colorado Yule Marble.

Holcim (US) Inc., formerly Holnam, Inc., operated two portland cement manufacturing plants in the State, one near La

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[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2001 USGS mineral production data published in this chapter are preliminary estimates as of August 2002 and are expected to change. For some mineral commodities, such as construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Specialist contact information may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals/contacts/comdir.html; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2] Values, percentage calculations, and rankings for 2000 may differ from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also change.

[3] John W. Keller, a Geologist at the Colorado Geological Survey, authored the text of the State mineral industry information provided by that agency.

Porte in Larimer County and one east of Florence in Fremont County. The La Porte plant produced about 430,000 t/yr of cement using the dry process. The Portland plant near Florence completed a $225 million expansion in 2001 that nearly doubled its capacity from 900,000 t/yr to 1,700,000 t/yr.

Radar Acquisitions Corp. of Calgary, Alberta, Canada, considered developing its "Limon Integrated Coal and Heavy Mineral" project on the plains of eastern Colorado near the town of Limon. Garnet, some rare-earth minerals, titanium minerals (ilmenite and rutile), and zircon were present within paleo/beach placer deposits in the Fox Hills Sandstone. In addition, deposits of lignite coal overlie the heavy-mineral deposits. The coal was also being considered for its economic potential.

The Kelsey Lake Mine, in Larimer County near the Wyoming border, produced diamonds for all of the fourth quarter of 2001. In 2001, the mine implemented a new crusher system and other upgrades to its processing plant and began mining on the Kelsey Lake No. 1 kimberlite pipe. A partnership that included Roberts Construction Co., WY, and BJ&J Ltd., Boulder, CO, owned an option to purchase the Great Western Diamond Co., which owned and operated the mine.

In early 2001, Consolidated Pacific Bay Minerals Ltd. of Vancouver, British Columbia, Canada, announced its intentions to acquire three diamond prospects in the State Line district of Larimer County from Diamond-X LLC. Diamond-X was a Denver-based company that staked the prospects in 1992. The three prospects are the George Creek, Pearl Creek, and Sand Creek properties. These properties were previously prospected and tested in the late 1970s and early 1980s by a joint venture between Superior Oil Corp. and Lac Minerals Ltd. The Superior-Lac joint venture also constructed a 45-metric-ton-per-day pilot plant near the Sloan kimberlites in the same district.

The Pride of the West Mill (formerly called the Howardsville Mill), northeast of Silverton in San Juan County, was renovated to process ore from mine waste piles in the Animas River watershed. The mill eventually will also process new ore from the nearby Silver Wing and Gold King mines. The mill was expected to start up later in 2002. A 14,000-t stockpile of ore from mine waste piles was already at the site awaiting processing, delivered by the Animas River Stakeholder's Group.

Rhodochrosite was designated the official State Mineral in April. Some of the finest rhodochrosite crystals in the world were mined at the Sweet Home Mine near Alma, CO.

Reference Cited

Blossom, J.W., 2002, Molybdenum: U.S. Geological Survey Mineral Commodity Summaries 2002, p. 112-113.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN COLORADO 1/ 2/

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral	1999		2000		2001 p/	
	Quantity	Value	Quantity	Value	Quantity	Value
Clays:						
Bentonite	1	W	W	W	W	W
Common	373	2,530	296	2,000	296	2,000
Gemstones	NA	261	NA	277	NA	269
Lime	40	2,380	37	2,170	35	2,100
Sand and gravel:						
Construction	45,200	217,000	43,900	216,000	39,500	197,000
Industrial	W	W	65	W	65	W
Stone:						
Crushed	13,200	75,500	13,000	81,900	13,500	87,700
Dimension metric tons	14,700	3,430	W	W	W	W
Combined values of cement, clays [fire (2000-01)], gold, gypsum (crude), helium (Grade-A), lead (1999), molybdenum concentrates, peat (1998), soda ash, silver, stone [dimension marble and sandstone (2000-01)], zinc (1999), and values indicated by symbol W	XX	282,000	XX	285,000 r/	XX	288,000
Total	XX	584,000	XX	588,000 r/	XX	577,000

r/ Revised. p/ Preliminary. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined values" data. XX Not applicable.

1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/ Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 2
COLORADO: CRUSHED STONE SOLD OR USED, BY KIND 1/

	1999				2000			
Kind	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone	8 r/	2,960 r/	$17,300 r/	$5.86 r/	10	3,050	$17,600	$5.76
Dolomite	1	W	W	4.39	1	W	W	4.53
Granite	7 r/	4,970 r/	27,700 r/	5.57 r/	9	4,450	33,100	7.43
Sandstone and quartzite	5 r/	2,710 r/	13,400 r/	4.94 r/	10	2,910	16,300	5.60
Traprock	1	W	W	10.42	1	W	W	3.69
Volcanic cinder and scoria	3 r/	W	W	3.75 r/	2	W	W	9.05
Miscellaneous stone	6 r/	1,810 r/	9,940	5.49 r/	17	2,080	12,800	6.16
Total or average	XX	13,200	75,500	5.71	XX	13,000	81,900	6.31

r/ Revised. W Withheld to avoid disclosing company proprietary data; included in "Total." XX Not applicable.

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

TABLE 3
COLORADO: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+1 1/2 inch):			
Macadam	W	W	$3.31
Riprap and jetty stone	517	$4,650	9.00
Filter stone	27	450	16.67
Other coarse aggregate	358	1,200	3.35
Total or average	902	6,300	6.99
Coarse aggregate, graded:			
Concrete aggregate, coarse	1,490	15,300	10.26
Bituminous aggregate, coarse	1,320	11,500	8.68
Bituminous surface-treatment aggregate	136	1,500	11.03
Railroad ballast	38	270	7.11
Total or average	2,990	28,500	9.56
Fine aggregate (-3/8 inch):			
Stone sand, concrete	W	W	6.57
Stone sand, bituminous mix or seal	769	2,790	3.63
Screening, undesignated	496	2,400	4.84
Other fine aggregate	139	911	6.55
Total or average	1,400	6,100	4.35
Coarse and fine aggregates:			
Graded road base or subbase	661	2,940	4.45
Unpaved road surfacing	300	1,450	4.83
Terrazzo and exposed aggregate	104	891	8.57
Crusher run or fill or waste	326	1,150	3.53
Total or average	1,390	6,430	4.62
Other construction materials	62	300	4.84
Agricultural:			
Agricultural limestone	(3/)	(3/)	40.00
Poultry grit and mineral food	(3/)	(3/)	23.98
Other agricultural uses	(3/)	(3/)	9.60
Chemical and metallurgical, cement manufacture	(3/)	(3/)	3.91
Special:			
Mine dusting or acid water treatment	(3/)	(3/)	26.60
Asphalt fillers or extenders	(3/)	(3/)	21.00
Other fillers or extenders	(4/)	(3/)	(3/)
Other miscellaneous uses and specified uses not listed	106	489	4.61
Unspecified: 5/			
Reported	3,920	20,200	5.15
Estimated	410	2,300	5.51
Total or average	4,340	22,500	5.19
Grand total or average	13,000	81,900	6.31

W Withheld to avoid disclosing company proprietary data; included with "Other."

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Includes dolomite, granite, limestone, miscellaneous stone, sandstone and quartzite, traprock, and volcanic cinder and scoria.

3/ Withheld to avoid disclosing company proprietary data, included in "Grand total."

4/ Less than ½ unit.

5/ Reported and estimated production without a breakdown by end use.

TABLE 4
COLORADO: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE AND DISTRICT 1/ 2/

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 4		District 5		District 6		Unspecified districts	
Use	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Construction:												
Coarse aggregate (+1 1/2 inch) 3/	W	W	W	W	W	W	557	2,900	--	--	--	--
Coarse aggregate, graded 4/	--	--	--	--	W	W	W	W	--	--	--	--
Fine aggregate (-3/8 inch) 5/	W	W	--	--	1,320	5,820	W	W	--	--	--	--
Coarse and fine aggregate 6/	W	W	W	W	1,040	4,470	W	W	W	W	--	--
Other construction materials	--	--	11	121	--	--	42	148	9	31	--	--
Agricultural 7/	--	--	W	W	--	--	W	W	--	--	--	--
Chemical and metallurgical 8/	--	--	W	W	W	W	--	--	--	--	--	--
Special 9/	--	--	W	W	--	--	W	W	W	W	--	--
Other miscellaneous use 10/	36	164	--	--	--	--	30	136	40	189	--	--
Unspecified: 11/												
Reported	168	879	--	--	2,520	13,200	1,220	6,030	(12/)	2	24	127
Estimated	40	220	--	--	370	2,100	--	--	--	--	--	--
Total	366	1,860	1,070	9,000	8,960	56,900	2,420	13,100	139	924	24	127

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ No production for District 3.

3/ Includes filter stone, macadam, riprap and jetty stone, and other coarse aggregate.

4/ Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), and railroad ballast.

5/ Includes stone sand (bituminous mix or seal), stone sand (concrete), screening (undesignated), and other fine aggregate.

6/ Includes crusher run (select material or fill), graded road base or subbase, terrazzo and exposed aggregate, and unpaved road surfacing.

7/ Includes agricultural limestone, poultry grit and mineral food, and other agricultural uses.

8/ Includes cement manufacture.

9/ Includes asphalt fillers or extenders mine dusting or acid water treatment and other fillers or extenders.

10/ Includes other specified uses not listed.

11/ Reported and estimated production without a breakdown by end use.

12/ Less than ½ unit.

TABLE 5
COLORADO: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	9,070	$52,300	$5.77
Plaster and gunite sands	94	843	8.97
Concrete products (blocks, bricks, pipe, decorative, etc.)	265	2,320	8.75
Asphaltic concrete aggregates and other bituminous mixtures	2,600	15,300	5.89
Road base and coverings	6,530	31,400	4.81
Road and other stabilization (cement and lime)	49	349	7.12
Fill	2,740	10,400	3.79
Snow and ice control	122	864	7.08
Other miscellaneous uses 2/	320	2,150	6.73
Unspecified: 3/			
Reported	14,100	64,300	4.56
Estimated	8,000	36,000	4.48
Total or average	43,900	216,000	4.92

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes filtration and railroad ballast.

3/ Reported and estimated production without a breakdown by end use.

TABLE 6
COLORADO: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products 2/	1,220	8,420	2,070	10,800	26	152
Asphaltic concrete aggregates and other bituminous mixtures	358	2,210	W	W	W	W
Road base and coverings 3/	2,080	9,880	1,490	9,560	700	2,460
Fill	781	3,520	364	1,330	W	W
Other miscellaneous uses 4/	142	975	614	2,890	206	2,210
Unspecified: 5/						
Reported	4,420	19,700	4,720	21,900	328	1,610
Estimated	1,500	6,300	2,500	11,000	99	380
Total	10,500	50,900	11,700	57,800	1,360	6,810
	District 4		District 5		District 6	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products 2/	3,670	24,000	2,150	10,200	285	1,810
Asphaltic concrete aggregates and other bituminous mixtures	777	4,890	409	1,990	W	W
Road base and coverings 3/	471	1,970	1,120	4,230	727	3,650
Fill	1,040	3,090	514	2,320	W	W
Other miscellaneous uses 4/	145	828	130	1,000	301	1,480
Unspecified: 5/						
Reported	4,190	19,400	309	1,420	142	274
Estimated	1,900	8,900	190	860	1,800	8,100
Total	12,200	63,100	4,820	22,000	3,220	15,300

W Withheld to avoid disclosing company proprietary data; included with "Other miscellaneous uses."

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

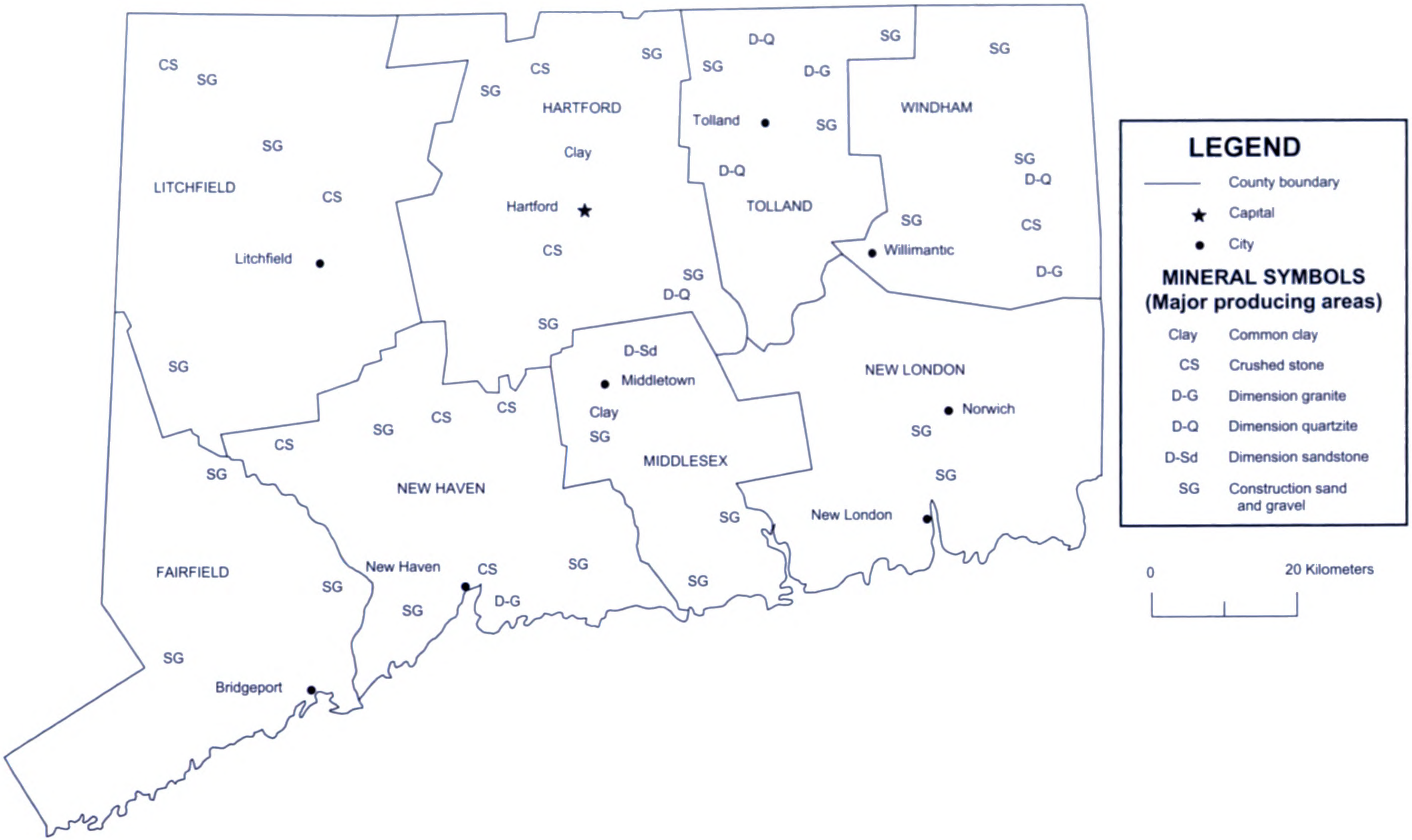
2/ Includes plaster and gunite sands.

3/ Includes road and other stabilization (cement and lime).

4/ Includes filtration, railroad ballast, and snow and ice control.

5/ Reported and estimated production without a breakdown by end use.

CONNECTICUT



Source: Connecticut Geological and Natural History Survey/U.S. Geological Survey (2001)

THE MINERAL INDUSTRY OF CONNECTICUT

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Connecticut Geological and Natural History Survey for collecting information on all nonfuel minerals.

In 2001, the estimated value[1] of nonfuel mineral production for Connecticut was nearly $104 million, based upon preliminary U.S. Geological Survey (USGS) data. This was a small decrease from that of 2000[2] and followed a 24% increase from 1999 to 2000. Crushed stone and construction sand and gravel, the leading nonfuel mineral commodities by value, accounted for nearly all of the State's total nonfuel mineral production and value. In 2001, decreases in both mineral commodities led to the small decrease for the year; the values of dimension quartzite (not included in table 1 to protect proprietary company data), common clays, and gemstones were unchanged from 2000 (listed in descending order of value). In 2000, Connecticut's increase in value mostly resulted from a 23% increase in the production of construction sand and gravel, corresponding with a $14.5 million rise in value (value up 44% from 1999), and a nearly 8% increase in crushed stone production, leading to an $8 million rise (up almost 14%) in that commodity's value (table 1).

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN CONNECTICUT 1/ 2/

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral		1999 Quantity	1999 Value	2000 Quantity	2000 Value	2001 p/ Quantity	2001 p/ Value
Clays, common		55	183	55	183	55	183
Gemstones		NA	6	NA	6	NA	6
Sand and gravel, construction		6,510	32,400	8,010	46,900	7,200	42,700
Stone:							
Crushed		7,170	57,400	7,740	65,300	7,000	60,900
Dimension	metric tons	W	(3/)	W	(3/)	W	(3/)
Total		XX	90,000	XX	112,000	XX	104,000

p/ Preliminary. NA Not available. W Withheld to avoid disclosing company proprietary data. XX Not applicable.
1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).
2/ Data are rounded to no more than three significant digits; may not add to totals shown.
3/ Value excluded to avoid disclosing proprietary data.

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[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2001 USGS mineral production data published in this chapter are preliminary estimates as of August 2002 and are expected to change. For some mineral commodities, such as construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Specialist contact information may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals/contacts/comdir.html; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2] Values, percentage calculations, and rankings for 2000 may differ from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also change.

TABLE 2
CONNECTICUT: CRUSHED STONE SOLD OR USED, BY KIND 1/

Kind	1999				2000			
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone	5	793	$7,220	$9.10	5	1,060	$8,450	$7.94
Dolomite	1	W	W	12.81	1	W	W	23.90
Granite	7 r/	254 r/	2,110 r/	8.32 r/	5	324	2,460	7.60
Traprock	9 r/	5,920 r/	45,800 r/	7.75	9	5,810	41,400	7.13
Miscellaneous stone	1	W	W	7.85	1	W	W	5.00
Total or average	XX	7,170	57,400	8.01	XX	7,740	65,300	8.44

r/ Revised. W Withheld to avoid disclosing company proprietary data; included in "Total." XX Not applicable.

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

TABLE 3
CONNECTICUT: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+1 1/2 inch):			
Riprap and jetty stone	11	$80	$7.27
Filter stone	W	W	12.10
Other coarse aggregate	63	899	14.27
Total or average	74	979	13.23
Coarse aggregate, graded:			
Concrete aggregate, coarse	41	225	5.49
Bituminous aggregate, coarse	136	750	5.51
Bituminous surface-treatment aggregate	136	750	5.51
Total or average	313	1,730	5.51
Fine aggregate (-3/8 inch):			
Stone sand, concrete	(3/)	(3/)	(3/)
Stone sand, bituminous mix or seal	(4/)	(4/)	5.55
Screening, undesignated	(4/)	(4/)	4.00
Total or average	15	77	5.13
Coarse and fine aggregates:			
Graded road base or subbase	491	3,120	6.35
Unpaved road surfacing	(4/)	(4/)	6.55
Crusher run or fill or waste	(4/)	(4/)	6.63
Total or average	565	3,610	6.38
Agricultural, agricultural limestone	27	445	16.48
Special:			
Asphalt fillers or extenders	91	1,000	10.99
Whiting or whiting substitute	363	10,000	27.55
Other fillers or extenders	91	2,000	21.98
Total or average	545	13,000	23.85
Other miscellaneous uses and specified uses not listed	18	134	7.44
Unspecified: 5/			
Reported	5,990	43,800	7.32
Estimated	200	1,500	7.72
Total or average	6,190	45,400	7.33
Grand total or average	7,740	65,300	8.44

W Withheld to avoid disclosing company proprietary data; included with "Other."

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Includes dolomite, granite, limestone, miscellaneous stone, and traprock.

3/ Less than ½ unit.

4/ Withheld to avoid disclosing company proprietary data; included in "Total."

5/ Reported and estimated production without a breakdown by end use.

TABLE 4
CONNECTICUT: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY MAJOR USE CATEGORY 1/

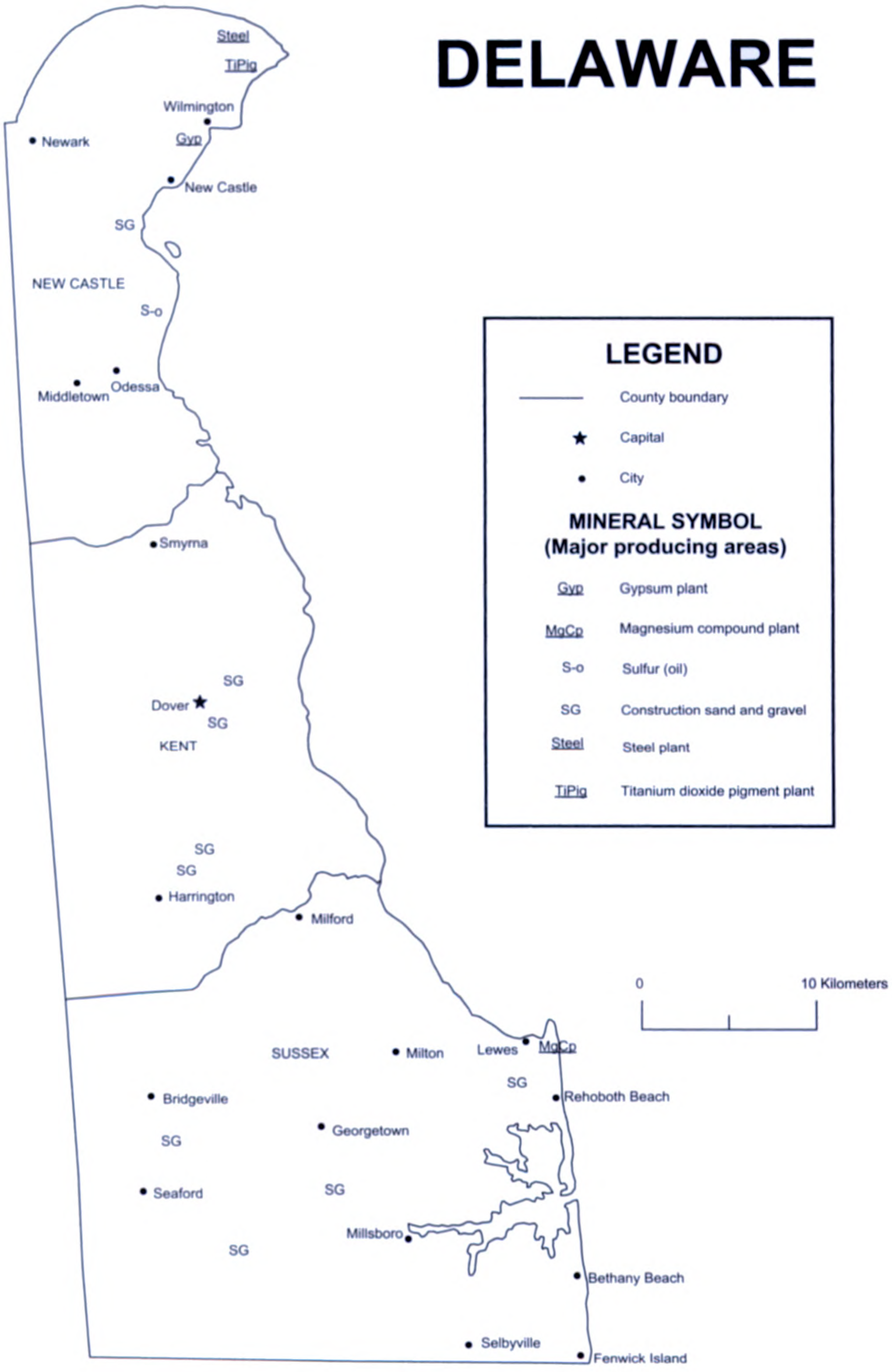
Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand) 2/	1,440	$11,700	$8.14
Concrete products (blocks, bricks, pipe, decorative, etc.)	296	1,690	5.72
Asphaltic concrete aggregates and other bituminous mixtures	385	2,040	5.30
Road base and coverings	549	3,730	6.79
Fill	358	1,810	5.06
Snow and ice control	290	1,450	5.00
Other miscellaneous uses 3/	124	1,420	11.43
Unspecified: 4/			
Reported	2,110	10,800	5.10
Estimated	2,500	12,000	4.97
Total or average	8,010	46,900	5.85

1/ Data are rounded to three significant digits, except unit value; may not add to totals shown.

2/ Includes plaster and gunite sands.

3/ Includes filtration.

4/ Reported and estimated production without a breakdown by end use.



Source: Delaware Geological Survey/U.S. Geological Survey (2001)

THE MINERAL INDUSTRY OF DELAWARE

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Delaware Geological Survey for collecting information on all nonfuel minerals.

In 2001, Delaware's estimated value[1] of nonfuel mineral production was $13.1 million, based upon preliminary U.S. Geological Survey (USGS) data. This was an increase of about $0.7 million from that of 2000[2] and followed an increase of about $1.6 million (up 14.8%) from 1999 to 2000. Production data for magnesium compounds were withheld to protect company proprietary data; the State's actual annual total values are significantly higher than those shown in table 1.

In 2001, construction sand and gravel production and value increased, while that of magnesium compounds decreased slightly. Likewise, in 2000, construction sand and gravel production increased, while its value rose by $1.6 million; magnesium compounds production was down, its value being down by close to $1 million. Gemstones mined by hobbyists were valued at the same level for both years.

Based upon USGS estimates of the quantities produced in the United States during 2001, Delaware remained fourth of five States that produce magnesium compounds. Magnesium compounds, extracted from seawater close to the mouth of the Delaware Bay, near Lewes, Sussex County, were used to manufacture chemical and pharmaceutical products.

The narrative information that follows was provided by the Delaware Geological Survey[3] (DGS). According to the DGS, there are at least 11major sand and gravel production operations in Delaware. General locations are shown on the map on the facing page and on the DGS Internet Web site at URL http://www.udel.edu/dgs/Minres/sandmap.html. The DGS estimates of the quantities of sand and gravel produced from the State's natural resources are typically higher than those previously reported by the USGS (table 1). Reasons for this difference include (1) not all major producers necessarily report production to the USGS, (2) government agencies or companies that produce from pits for their own use do not necessarily report production, (3) many operations that mine relatively small amounts of sand and gravel are not contacted and, therefore, do not report production, and (4) production of sand from offshore areas for beach replenishment is not included in USGS figures. For example, according to the Delaware Department of Natural Resources and Environmental Control, in 1998, approximately 2.2 million metric tons of sand with an estimated value of $6.9 million was dredged offshore Delaware and placed on beaches along the Atlantic Coast and Delaware Bay.

The U.S. Department of the Interior's Minerals Management Service (MMS) continued to provide support for studies to characterize offshore sand resources in both State and Federal waters for possible use for beach replenishment. The DGS recently completed a report entitled "An Evaluation of Sand Resources, Atlantic Offshore, Delaware." Evaluation of 266 vibracores along with geologic mapping and evaluation of seismic data resulted in the identification of 16 coastal areas of Delaware as excellent or good sand resource areas covering nearly 28 square kilometers containing an estimated 80 million cubic meters of the resource. An additional 20 vibracores are currently being evaluated.

The DGS continues to operate and maintain the DGS Atlantic Outer Continental Shelf Core and Sample Repository. Federal agencies, other State agencies, and private institutions that recognize the value of having a centralized repository contributed samples. The repository contains samples from all 51 oil and gas exploratory wells drilled on the North, Middle, and South Atlantic Outer Continental Shelf between 1977 and 1984. Samples include cores, unwashed cuttings, vials containing samples processed for micropaleontology and palynology, thin sections of cores and cuttings, and micropaleontology and palynology slides. The DGS Internet Web site's summary of holdings is available on the Internet at URL http://www.udel.edu/dgs/Minres/ocsrepos.htm. The DGS is designated as the primary repository for these samples by the MMS.

The DGS continues to be actively involved in the mineral industry in Delaware through the identification and evaluation of sand and gravel resources as part of its geologic and hydrologic mapping programs and through service on a county committee involved in evaluating and renewing applications for extractive use operations.

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[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2001 USGS mineral production data published in this chapter are preliminary estimates as of August 2002 and are expected to change. For some mineral commodities, such as construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Specialist contact information may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals/contacts/comdir.html; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2] Values, percentage calculations, and rankings for 2000 may differ from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also change.

[3] John H. Talley, Interim Director and State Geologist, authored the text of the State mineral industry information provided by the Delaware Geological Survey.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN DELAWARE 1/ 2/

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral		1999		2000		2001 p/	
		Quantity	Value	Quantity	Value	Quantity	Value
Gemstones		NA	1	NA	1	NA	1
Magnesium compounds	metric tons	W	(3/)	W	(3/)	W	(3/)
Sand and gravel, construction		2,100	10,800	2,330	12,400	2,420	13,100
Total		XX	10,800	XX	12,400	XX	13,100

p/ Preliminary. NA Not available. W Withheld to avoid disclosing company proprietary data. XX Not applicable.

1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/ Data are rounded to no more than three significant digits; may not add to totals shown.

3/ Value excluded to avoid disclosing company proprietary data.

TABLE 2
DELAWARE: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand) 2/	1,600	$8,820	$5.51
Other miscellaneous uses 3/	578	2,860	4.94
Unspecified, estimated 4/	150	770	5.04
Total or average	2,330	12,400	5.34

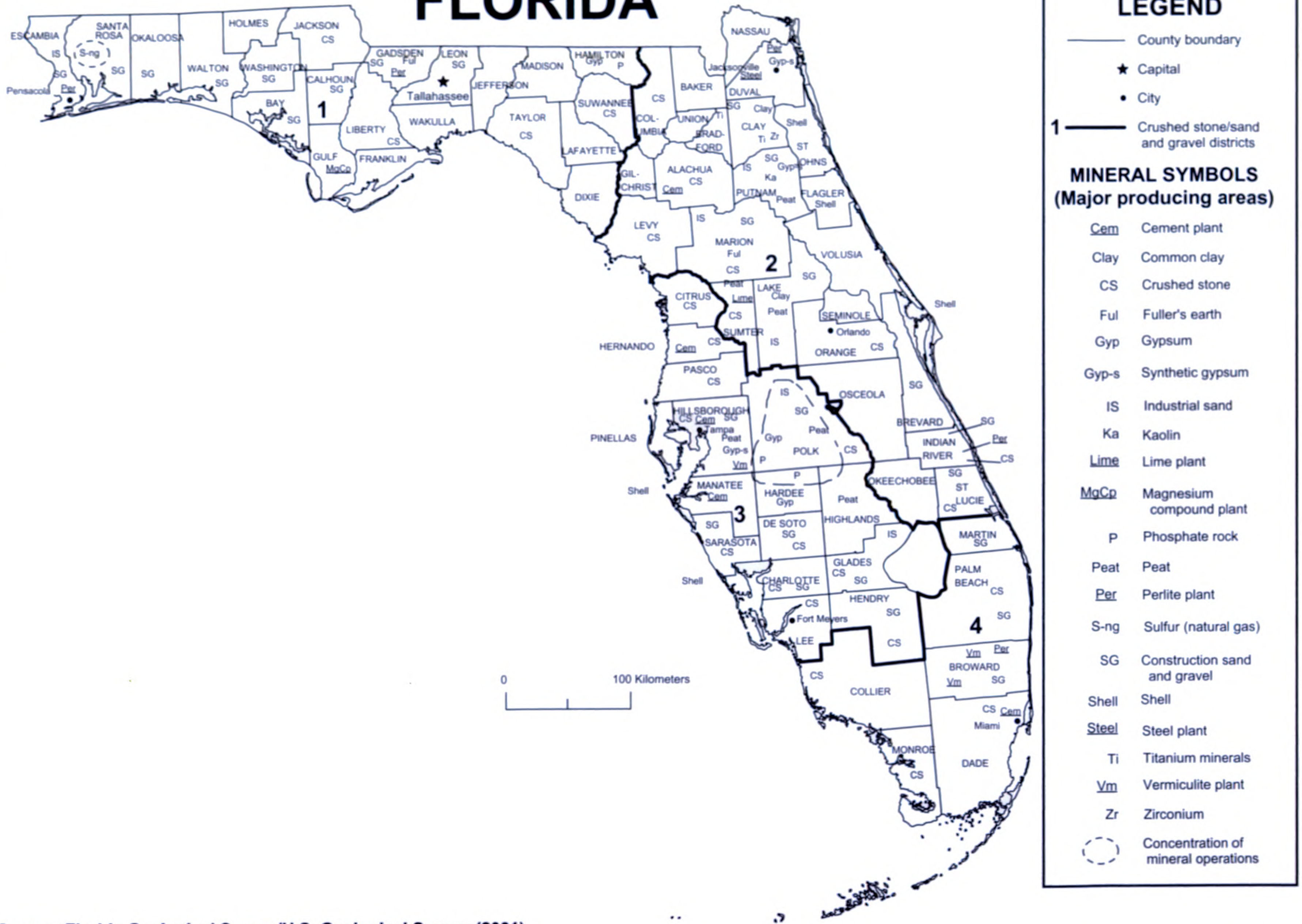
1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes plaster and gunite sands.

3/ Includes asphaltic concrete aggregates and other bituminous mixtures, fill, road base and coverings, and snow and ice control.

4/ Reported and estimated production without a breakdown by end use.

FLORIDA



Source: Florida Geological Survey/U.S. Geological Survey (2001)

THE MINERAL INDUSTRY OF FLORIDA

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Florida Geological Survey for collecting information on all nonfuel minerals.

In 2001, the estimated value[1] of nonfuel mineral production for Florida was about $1.75 billion, based upon preliminary U.S. Geological Survey (USGS) data. This was less than a 4% decrease from that of 2000[2] and followed a 9.9% decrease in 2000 from that of 1999. In 2001, for the third time in the past 4 years, Florida ranked 5th (4th in 1999) among the 50 States in total nonfuel mineral production value, of which the State accounted for almost 4.5% of the U.S. total.

Florida continued to be the Nation's leading phosphate rock-mining State in 2001, producing more than five times as much as the next highest producing State. Phosphate rock is produced in only four States. In terms of value, phosphate rock, crushed stone, cement (portland and masonry), and construction sand and gravel continued to be the most important raw nonfuel mineral commodities produced in Florida. The dollar value of these four mineral commodities when added together with that of the titanium concentrates of ilmenite and rutile represented about 94% of the State's total nonfuel mineral value. In 2001, a significant decrease in the value of phosphate rock accounted for most of the State's decrease in value. This was countered in part by increases that occurred in cement, zirconium concentrates, construction sand and gravel, magnesium compounds, and titanium concentrates (table 1).

In 2000, significant increases occurred in portland and masonry cement, up a combined $39 million, and in crushed stone, up $29 million. These increases were further bolstered by increases, ranging from about $4 million to slightly less than $1 million, in the values of magnesium compounds, zirconium concentrates, titanium concentrates (ilmenite and rutile combined), fuller's earth, and staurolite. But these were not enough to offset a more than $250 million decrease in the value of phosphate rock. Producers of fertilizer in Florida and North Carolina were affected by lower export sales and prices, which resulted from the opening of new phosphoric acid and diammonium phosphate (DAP) plants in Asia. The weak market conditions led to reduced production from phosphate rock mines and phosphoric acid plants in 2001. One mine in Florida closed permanently in August 2000 owing to market conditions; the company began using phosphate rock imported from Morocco at its fertilizer plant. Since mid-1999, four mines have closed in Florida as part of corporate restructuring programs and depletion of reserves. Overall, production in the Florida-North Carolina region during 2001 was 77% of rated annual capacity. In addition, construction sand and gravel was down about $7 million (table 1).

Based upon USGS estimates of production in the 50 States in 2001, Florida continued to be the only State to produce rutile concentrates and staurolite; first in peat and first of two States producing ilmenite concentrates and zirconium concentrates; third in crushed stone; fifth in fuller's earth; and seventh in portland cement. The State decreased to second from first in masonry cement and to third from second in magnesium compounds. Additionally, Florida produced significant quantities of construction and industrial sand and gravel.

The Florida Geological Survey[3] provided the following narrative information. The Mine Safety and Health Administration reported in 2001 that there were 6,784 persons employed in Florida's surface mining operations. This number does not take into account contractors that may be working for some operators. The limestone industry employed more than 2,665, and the phosphate industry was second with 2,055 workers. The remainder of the workforce was from sand and gravel companies, cement operations, the heavy-mineral sands industry, and clay mines operations.

Florida producers supplied approximately one-quarter of the world's phosphate needs and three-quarters of U.S. domestic needs. Nearly all of the rock that was mined in Florida, which was about 29 million metric tons (Mt) in 2000 (down slightly from 30 Mt in 1999). About 95% was used to manufacture fertilizer, and the remaining 5% was used in animal feed supplements, vitamins, soft drinks, and toothpaste.

Mulberry Corp., owner of the Piney Point Phosphate plant, went bankrupt in 2001. While it filed for Chapter 11 bankruptcy, the U.S. Environmental Protection Agency (EPA) as well as the State of Florida Department of Environmental Protection (DEP) assumed control Mulberry and the Piney Point plant. The Florida DEP paid more than $400,000 per month to maintain the plant and keep highly acidic wastewater from seeping into Tampa Bay. The State of Florida was prepared to spend tens of millions of dollars to seal Piney Point's mountain range of phosphogypsum stacks, which contain the highly acidic water, and shut the plant down completely. Phosphogypsum is a radioactive waste of phosphate processing that the EPA requires to be stored indefinitely on site in huge mounds. Pumps keep the phosphogypsum circulating within the mounds to prevent leakage into the ground water (Unger, 2001).

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[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2001 USGS mineral production data published in this chapter are preliminary estimates as of August 2001 and are expected to change. For some mineral commodities, such as construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Specialist contact information may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals/contacts/comdir.html; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2] Values, percentage calculations, and rankings for 2000 may differ from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also change.

[3] Steven Spencer, Coastal/Economic Geologist, authored the text of the State mineral industry information provided by the Florida Geological Survey.

Phosphate companies actively mining in the State included Cargill Fertilizer, Inc., CF Industries, Inc., IMC Phosphates MP Inc., and PCS-Phosphate Co., Inc. IMC continued the process of obtaining permits to open various sites including Horse Creek in Manatee County and at Ona in Hardee County. PCS Phosphate laid off several employees due to the closure of a DAP plant in Hamilton County that was caused by market conditions in 2001. In 2001, IMC closed all four of its mines for the entire months of July and December to reduce inventories of phosphate rock that had accumulated from the closure of its phosphoric acid plants in Louisiana and lower production rates at its Florida facilities.

Most of the stone that was mined in Florida was used for road base material. Other uses included concrete and asphalt aggregate, cement manufacturing, fertilizer, soil conditioning, and rip rap.

During 2001, the State of Florida approved the purchase of the 47-hectare (ha) Harmon Brothers Rock Co. mine located near Copeland, FL. The State also agreed to purchase the Kirby Mine located about 50 kilometers north of Gainesville, FL, near the Ichetucknee River. In the case of the latter, it was the State's intent is to protect the Ichetucknee River from potential pollution.

Bergeron Sand, Rock and Aggregate Inc. sold its interest in the Mazak Limestone Mine in Sumter County to Bedrock Resources in 2001.

The Florida DEP issued permits for 10 mines in the Miami-Dade Lake Belt Area. The 10-year permits allow companies to dredge or fill about 2,200 ha of wetlands. Monies from a State-imposed fee on each ton of mined material will be used to acquire wetlands and conduct wetland enhancement and create recreation areas.

Environmental resource permits (ERPs) were issued to 10 of the 11 mines in the Miami-Dade Lake Belt Area. (Three permits were issued in 2001, and the other seven permits were issued in early 2002.) The permits for these mines, which are near a public well, will be subject to review in 3 years. All of the permits will be subject to review and renewal in 10 years. The Army Corps of Engineers announced its intention to issue the 10 Federal permits, but local approvals were still going to be required.

Babcock Florida Co. received an ERP permit in February, 2002, to double the size of their mine in Charlotte County to 773 ha.

Limestone of high purity can undergo calcination (heating) and, together with other ingredients, be used to manufacture portland and masonry cement. Florida was a major producer and consumer of these two types of cement during year 2001. Work began on the new Suwannee American Inc. cement plant in Branford, FL, in 2001.

Florida produced both construction and industrial grade quartz sand. Sand was mined at many localities throughout the State. Quartz gravel only came from certain areas along the Trail Ridge region of the peninsula or from northwest Florida.

Fuller's earth, common clay, and kaolin were mined in few locations in Florida. Fuller's earth, typically used as an absorbent material, was mined in Gadsden and Marion Counties; kaolin, often used in the manufacture of paper and refractories, was mined in Putnam County. Common clay was mined in small quantities from various locations throughout the State and was often used in the manufacture of brick, cement, and lightweight aggregate.

Two of the five companies that mine heavy minerals in the Unites States were located in Florida. E.I. du Pont de Nemours and Company, Inc., and Iluka Resources, Inc. operated mines in northeast Florida in Clay, Baker, and Putnam Counties. A variety of minerals were located in the Florida heavy-mineral sand deposits including ilmenite, rutile, zircon, and leucoxene. Ilmenite and rutile were primary ingredients in the manufacture of titanium dioxide pigments. These pigments were used in the manufacture of paint, plastics, paper, and varnish and lacquers. Iluka Resources put the local government approval process on indefinite hold for its proposed Yulee heavy-minerals mine. Iluka planned to proceed with the expansion in 2002.

A bill was proposed to impose a bond on phosphogypsum stacks. The bond money would be used for stack closure in the event the company failed to perform their obligation.

Reference Cited

Unger, H.M., 2001, Piney Point nears closure by DEP: Sarasota [Florida] Herald-Tribune, March 28, p. A1.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN FLORIDA 1/ 2/

(Thousand metric tons and thousand dollars)

Mineral	1999		2000		2001 p/	
	Quantity	Value	Quantity	Value	Quantity	Value
Cement:						
Masonry	494	50,900 e/	546	64,900 e/	510 e/	61,200 e/
Portland	3,500	260,000 e/	3,750	285,000 e/	4,010 e/	305,000 e/
Clays, kaolin	35	3,830	33	3,420	34	3,580
Gemstones	NA	1	NA	1	NA	1
Peat	408	8,180	416	8,640	516	9,490
Sand and gravel:						
Construction	27,200	114,000	24,500	107,000	24,600	110,000
Industrial	509	6,370	510	6,320	495	6,300
Stone, crushed	91,700	466,000	93,000	495,000	90,000	494,000
Combined values of clays (common, fuller's earth), magnesium compounds, phosphate rock, staurolite, titanium concentrates, zirconium concentrates	XX	1,110,000	XX	848,000	XX	760,000
Total	XX	2,020,000	XX	1,820,000	XX	1,750,000

e/ Estimated. p/ Preliminary. NA Not available. XX Not applicable.

1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/ Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 2
FLORIDA: CRUSHED STONE SOLD OR USED, BY KIND 1/

Kind	1999				2000			
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of Quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone 2/	95 r/	87,900 r/	$442,000 r/	$5.03	85	89,200	$472,000	$5.29
Dolomite	5	W	W	W	5	W	W	W
Granite	1	W	W	W	--	--	--	--
Shell	6 r/	1,480 r/	6,360 r/	4.31 r/	5	W	W	W
Total or average	XX	91,700	466,000	5.08	XX	93,000	495,000	5.33

r/ Revised. W Withheld to avoid disclosing company proprietary data; included in "Total." XX Not applicable. -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes limestone-dolomite reported with no distinction between the two.

TABLE 3
FLORIDA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+11/2 inch):			
Riprap and jetty stone	228	$2,090	$9.18
Filter stone	101	673	6.66
Other coarse aggregate	98	483	4.93
Total or average	427	3,250	7.61
Coarse aggregate, graded:			
Concrete aggregate, coarse	13,200	90,200	6.85
Bituminous aggregate, coarse	6,870	49,400	7.18
Railroad ballast	W	W	5.34
Other graded coarse aggregate	9,210	60,500	6.56
Total or average	29,200	200,000	6.84
Fine aggregate (-3/8 inch):			
Stone sand, concrete	4,200	24,600	5.85
Stone sand, bituminous mix or seal	3,000	19,300	6.43
Screening, undesignated	2,110	11,800	5.61
Other fine aggregate	8,980	42,000	4.67
Total or average	18,300	97,600	5.34
Coarse and fine aggregates:			
Graded road base or subbase	12,500	51,900	4.16
Crusher run or fill or waste	5,690	22,800	4.00
Other coarse and fine aggregates	2,600	13,300	5.12
Total or average	20,800	88,000	4.24
Other construction materials	189	658	3.48
Agricultural limestone	(3/)	(3/)	5.95
Chemical and metallurgical, cement manufacture	(3/)	(3/)	3.58
Special, other fillers or extenders	(3/)	(3/)	5.79
Other miscellaneous uses and specified uses not listed	(3/)	(3/)	5.00
Unspecified: 4/			
Reported	9,900	44,300	4.48
Estimated	6,900	32,000	4.66
Total or average	16,800	76,500	4.55
Grand total or average	93,000	495,000	5.33

W Withheld to avoid disclosing company proprietary data; included with "Other."

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes dolomite, limestone, limestone-dolomite, and shell.

3/ Withheld to avoid disclosing company proprietary data; included in "Grand total."

4/ Reported and estimated production without a breakdown by end use.

TABLE 4
FLORIDA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3		District 4	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Construction:								
Coarse aggregate (+1 1/2 inch) 2/	W	W	W	W	64	403	303	1,940
Coarse aggregate, graded 3/	W	W	W	W	8,060	69,400	20,400	122,000
Fine aggregate (-3/8 inch) 4/	W	W	W	W	4,590	28,600	13,400	66,700
Coarse and fine aggregate 5/	493	3,520	5,250	21,000	3,290	14,400	11,700	49,100
Other construction materials	--	--	--	--	--	--	189	658
Agricultural 6/	W	W	W	W	W	W	--	--
Chemical and metallurgical 7/	--	--	--	--	W	W	W	W
Special 8/	--	--	--	--	W	W	--	--
Other miscellaneous uses and specified uses not listed	--	--	W	W	--	--	W	W
Unspecified: 9/								
Reported	854	4,000	4,600	19,500	231	1,080	4,220	19,800
Estimated	1,500	7,200	2,500	12,000	2,200	10,000	630	2,900
Total	3,340	20,700	13,300	59,500	23,000	143,000	53,300	272,000

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes filter stone, riprap and jetty stone, and other coarse aggregate.

3/ Includes bituminous aggregate (coarse), concrete aggregate (coarse), railroad ballast, and other graded coarse aggregate.

4/ Includes screening (undesignated), stone sand (bituminous mix or seal), stone sand (concrete), and other fine aggregate.

5/ Includes crusher run (select material or fill), graded road base or subbase, and other coarse and fine aggregates.

6/ Includes agricultural limestone.

7/ Includes cement manufacture.

8/ Includes other fillers or extenders.

9/ Reported and estimated production without a breakdown by end use.

TABLE 5
FLORIDA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	10,500	$52,500	$4.97
Plaster and gunite sands	896	4,290	4.79
Concrete products (blocks, bricks, pipe, decorative, etc.)	1,070	5,020	4.67
Asphaltic concrete aggregates and other bituminous mixtures	132	640	4.85
Road base and coverings 2/	624	2,620	4.20
Fill	1,830	4,470	2.44
Other miscellaneous uses 3/	1,300	7,910	6.08
Unspecified: 4/			
Reported	2,450	10,800	4.43
Estimated	5,700	20,000	3.44
Total or average	24,500	107,000	4.39

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes road and other stabilization (lime).

3/ Includes filtration.

4/ Reported and estimated production without a breakdown by end use.

TABLE 6
FLORIDA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

	District 1		District 2		Districts 3 and 4	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products 2/	W	W	W	W	5,650	25,700
Asphaltic concrete aggregates and road base materials 3/	W	W	W	W	635	2,590
Fill	216	505	188	835	1,430	3,130
Other miscellaneous uses 4/	950	3,880	6,310	34,600	1,030	6,000
Unspecified: 5/						
Reported	407	2,970	1,270	5,190	767	2,670
Estimated	1,600	5,600	2,400	8,500	1,700	5,400
Total	3,180	13,000	10,100	49,100	11,200	45,400

W Withheld to avoid disclosing company proprietary data; included with "Other miscellaneous uses."

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

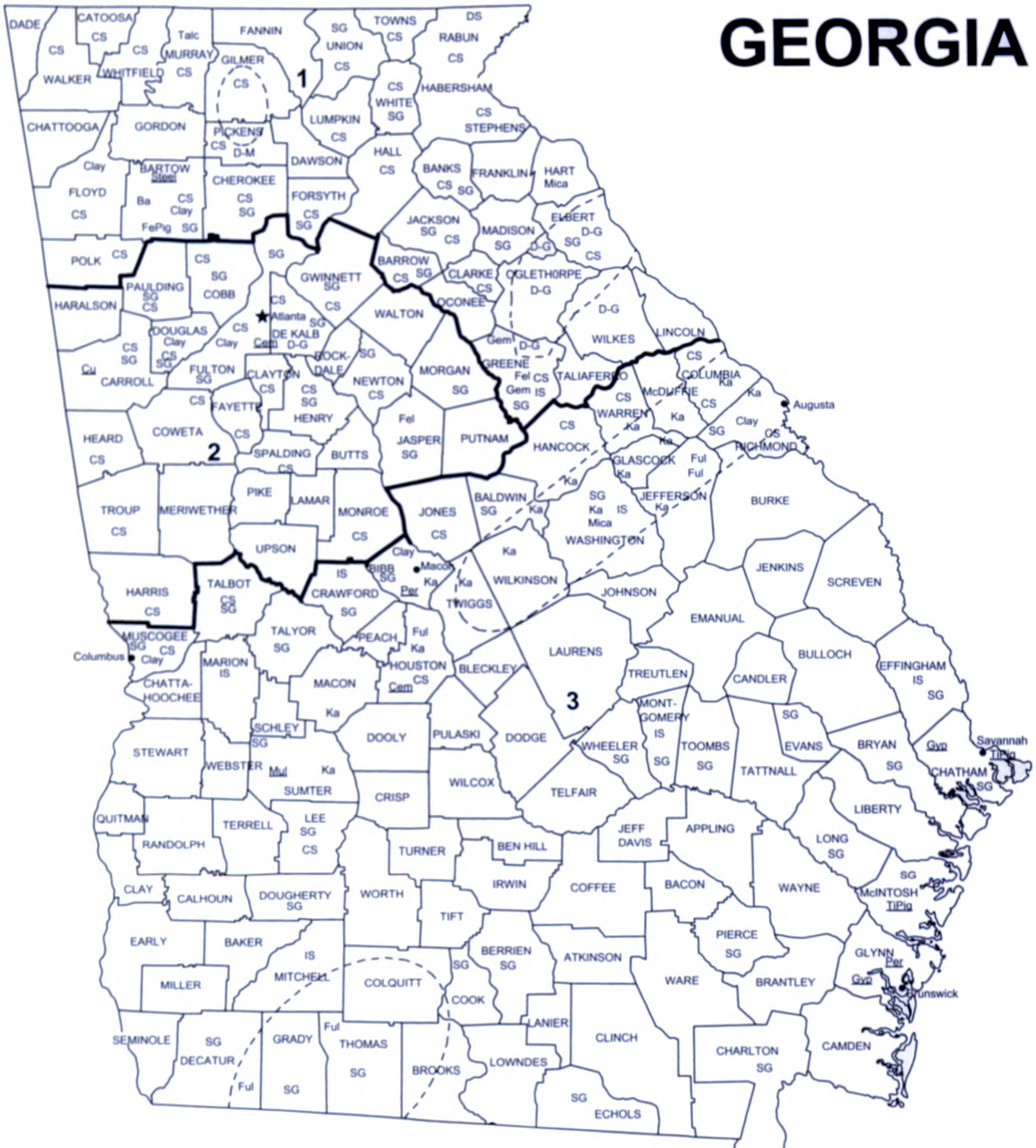
2/ Includes plaster and gunite sands.

3/ Includes road and other stabilization (lime).

4/ Includes filtration.

5/ Reported and estimated production without a breakdown by end use.

GEORGIA



LEGEND

—	County boundary
★	Capital
•	City
1 ━	Crushed stone/sand and gravel districts

0 50 Kilometers

MINERAL SYMBOLS
(Major producing areas)

Ba	Barite	DS	Dimension stone	Mica	Mica
Cem	Cement plant	Fel	Feldspar	Mul	Synthetic mullite plant
Clay	Common clay	FePig	Iron oxide pigments	Per	Perlite plant
CS	Crushed stone	Ful	Fuller's earth	SG	Construction sand and gravel
Cu	Copper plant	Gem	Gemstones	Steel	Steel plant
D-G	Dimension granite	Gyp	Gypsum plant	Talc	Talc
D-M	Dimension marble	IS	Industrial sand	TiPig	Titanium dioxide pigment plant
		Ka	Kaolin	◌	Concentration of mineral operations

Source: Georgia Geologic Survey/U.S. Geological Survey (2001)

THE MINERAL INDUSTRY OF GEORGIA

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Georgia Geologic Survey for collecting information on all nonfuel minerals.

In 2001, the estimated value[1] of nonfuel mineral production for Georgia was $1.61 billion, based upon preliminary U.S. Geological Survey (USGS) data. This was a marginal decrease from that of 2000[2] and followed a 1.2% decrease from 1999 to 2000. The State, for the second consecutive year, ranked seventh among the 50 States in total nonfuel mineral production value, of which Georgia accounted for about 4% of the U.S. total.

Georgia was by far the leading clay-producing State in the Nation in 2001, accounting for about 24% of total U.S. clay production (all kinds). Kaolin remained the State's foremost nonfuel mineral commodity, accounting for about 54% of Georgia's estimated total nonfuel mineral value and, of that, nearly 92% of its clay value. Crushed stone was second, accounting for almost 29% of Georgia's nonfuel mineral value, followed by cement (portland and masonry) and fuller's earth. In 2000, increases that occurred in portland cement (up about $9 million), fuller's earth (up $7.6 million), crushed stone (up $4 million), and industrial sand and gravel were not enough to offset decreases in kaolin (down $30 million), crushed marble, iron oxide pigments, and construction sand and gravel, resulting in the net decrease for the year (table 1). All other changes were less than $1 million, having minimal effect on the overall net total.

Based upon USGS estimates of the quantities produced in the United States during 2001, Georgia remained first among the 50 States in kaolin, fuller's earth, and iron oxide pigments (descending order of value); second of three barite-producing States; fourth in common clays and feldspar; among the top six States that produced dimension stone (fifth in 2000); and ninth in masonry cement. The State rose to second from fifth in the production of crude mica and decreased to sixth from fourth in crushed stone. Additionally, the State was a significant producer of portland cement and industrial sand and gravel.

The following narrative information was provided by the Georgia Geologic Survey,[3] in cooperation with representatives of Elberton Granite Association, the Georgia Mining Association, and the China Clay Producers Association. Georgia's mining industry is dominated by the kaolin and crushed stone industries. Overall, the mining industry was strong and spent millions of dollars on research and development. In support of the industry, the Georgia Mining Association sponsored a variety of mining industry-related activities. In 2001, the Association sponsored environmental and safety training and education seminars and workshops and awarded $40,000 in college scholarships to 70 Georgia high school students. Additional information on mining in Georgia and the Georgia Mining Association is available on the Internet at URL www.georgiamining.org.

Georgia's kaolin industry was concentrated in the four members of the China Clay Producers Association: Engelhard Corp., IMERYS Pigments and Additives Group, J.M. Huber Corp., and Thiele Kaolin Co. In 2001, the Association's members announced an after tax loss of $93 million for 2001. This represented a negative on the net investment for the industry of 10% (compared to a 1999 profit of $33.2 million and a return of 2.7%). Struggling with its worst losses in a decade, the kaolin industry worked in an extremely difficult operating environment. In 2001, the industry employed just under 3,000 individuals—down from its peak of 4,500. Additional information on Georgia's kaolin and the China Clay Producers Association is available on the Internet at URL http://www.kaolin.com.

The Georgia crushed stone industry is largely dependent on heavy construction, and the market is almost evenly distributed between three major sectors: residential, office, and shopping center construction; road and highway construction; and other public works projects.

Florida Rock Industries, Inc.; Hanson Aggregates East; LaFarge Construction Materials; Martin Marietta Aggregates; and Vulcan Materials Co. were the largest producers. Aggregate quarries were located in Georgia's Valley and Ridge (limestone and dolostone), Blue Ridge (metagranite and metaconglomerate), and Piedmont (granite and granitic gneiss) Provinces.

Other crushed stone manufacturers included Global Stone Corp., IMERYS Pigments and Additives Group, and J.M. Huber Corp. All three companies crush and grind either limestone or marble from Valley and Ridge or Blue Ridge underground mines. End products were used in the manufacture of various commodities, including extender for latex carpet backing, caulks, sealants, and paints. High brightness, chemically pure materials are included in pharmaceuticals and are employed as a coating for high-quality papers in lieu of kaolin.

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[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2001 USGS mineral production data published in this chapter are preliminary estimates as of August 2002 and are expected to change. For some mineral commodities, such as construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Specialist contact information may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals/contacts/comdir.html; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2] Values, percentage calculations, and rankings for 2000 may differ from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also change.

[3] Bruce J. O'Connor, Principal Geologist, authored the text of the State mineral industry information provided by the Georgia Geologic Survey.

Georgia's dimension granite industry was concentrated in the five-county Elberton granite district (Elbert, Oglethorpe, Madison, Greene, and Wilkes Counties) in central eastern Georgia; however, most quarries and plants were in Elbert County. In 2001, there were approximately 45 active quarries in the district with 321 production workers and an annual payroll of $7.2 million. The total workforce in the district, including more than 150 granite manufacturing operations, was approximately 2,400 persons with a total payroll of $57.7 million. A shortage of skilled labor, however, was a limiting factor in granite production in the district. The association continued to assist member companies by providing wage supplements for new employees for a period of 3 months.

In 2001, Rock of Ages sold all of its numerous quarry operations in Georgia to various other companies located in the district. The sale involved 14 quarries and three manufacturing facilities in Elbert, Madison, and Oglethorpe Counties.

The demand for Elberton's monumental-grade granite experienced a continued slowdown throughout the domestic market in 2001. In addition, the district has lost more than 95% of its rough stock sales in the Asian markets to the Chinese. The volume of finished memorials being imported by brokers from India and China continues to grow and is having a serious impact on Elberton's granite producers (King, 2002).

The use of high-pressure water-cutting systems ("water jet") as a method of cutting granite within the quarries grew in popularity. Approximately 25% of the quarries in the district used this method. However, installing and operating this equipment was a significant investment. Consequently, the remaining quarries in the district continue to use the flame burner. In the manufacturing facilities, diamond saws were used exclusively for cutting the quarried blocks.

Reference Cited

King, Neil, Jr., 2002, Grave reservations—Why Dr. Su's arrival rocks Georgia town: Wall Street Journal, July 23, p. A1, A6.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN GEORGIA 1/ 2/

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral	1999		2000		2001 p/	
	Quantity	Value	Quantity	Value	Quantity	Value
Clays:						
Common	1,600	5,130	1,500	5,200	1,500	5,200
Fuller's earth	725	73,800	919	81,400	655	72,300
Kaolin	8,170	907,000	7,660	877,000	7,610	877,000
Gemstones	NA	9	NA	8	NA	8
Sand and gravel:						
Construction	7,200	30,100	6,940	28,700	7,000	29,400
Industrial	612	11,100	651	12,200	645	12,500
Stone:						
Crushed 3/	74,200	448,000	76,500	452,000	76,000	463,000
Dimension metric tons	83,400	12,200	74,200	11,400	74,000	11,000
Combined values of barite, cement, feldspar, iron oxide pigments (crude), lime, mica (crude), stone (crushed marble)	XX	153,000	XX	151,000	XX	137,000
Total	XX	1,640,000	XX	1,620,000	XX	1,610,000

p/ Preliminary. NA Not available. XX Not applicable.
1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).
2/ Data are rounded to no more than three significant digits; may not add to totals shown.
3/ Excludes certain stones; kind and value included with "Combined values" data.

TABLE 2
GEORGIA: CRUSHED STONE SOLD OR USED, BY KIND 1/

	1999				2000			
Kind	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone	15 r/	8,740 r/	$54,500 r/	$6.24 r/	17	8,890	$54,200	$6.10
Dolomite	2	W	W	6.60	2	W	W	6.70
Granite	54 r/	63,800 r/	384,000	6.01	54	66,100	388,000	5.87
Marble	10	(2/)	(2/)	(2/)	6	(2/)	(2/)	(2/)
Quartzite	2	W	W	4.18	2	W	W	4.50
Total or average	XX	74,200	448,000	6.03 r/	XX	76,500	452,000	5.91

r/ Revised. W Withheld to avoid disclosing company proprietary data; included in "Total." XX Not applicable.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Withheld from total to avoid disclosing company proprietary data.

TABLE 3
GEORGIA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+1 1/2 inch):			
Riprap and jetty stone	628	$6,950	$11.06
Filter stone	W	W	9.37
Other coarse aggregate	750	5,250	7.00
Total or average	1,380	12,200	8.85
Coarse aggregate, graded:			
Concrete aggregate, coarse	9,160	56,300	6.15
Bituminous aggregate, coarse	6,080	44,000	7.23
Bituminous surface-treatment aggregate	W	W	9.69
Railroad ballast	W	W	4.93
Other graded coarse aggregate	12,000	75,200	6.27
Total or average	27,200	176,000	6.44
Fine aggregate (-3/8 inch):			
Stone sand, concrete	3,640	20,900	5.74
Stone sand, bituminous mix or seal	W	W	6.72
Screening, undesignated	1,030	3,630	3.51
Other fine aggregate	4,100	20,800	5.07
Total or average	8,770	45,300	5.17
Coarse and fine aggregates:			
Graded road base or subbase	5,550	25,500	4.60
Unpaved road surfacing	W	W	4.63
Crusher run or fill or waste	6,990	43,500	6.22
Other coarse and fine aggregates	5,220	23,500	4.50
Total or average	17,800	92,500	5.21
Other construction materials	294	1,230	4.17
Agricultural, agricultural limestone	(3/)	(3/)	9.00
Chemical and metallurgical, cement manufacture	(3/)	(3/)	5.41
Special:			
Mine dusting or acid water treatment	2	7	3.50
Whiting or whiting substitute	363	4,200	11.57
Other fillers or extenders	(3/)	(3/)	5.79
Other miscellaneous uses and specified uses not listed	2	8	4.00
Unspecified: 4/			
Reported	17,700	105,000	5.92
Estimated	1,100	6,000	5.46
Total or average	18,800	111,000	5.89
Grand total or average	76,500	452,000	5.91

W Withheld to avoid disclosing company proprietary data; included with "Other."

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Includes dolomite, granite, limestone, and quartzite; excludes marble from total to avoid disclosing company proprietary data.

3/ Withheld to avoid disclosing company proprietary data, included in "Grand total."

4/ Reported and estimated production without a breakdown by end use.

TABLE 4
GEORGIA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE AND DISTRICT 1/ 2/

(Thousand metric tons and thousand dollars)

Use	District 1 Quantity	District 1 Value	District 2 Quantity	District 2 Value	District 3 Quantity	District 3 Value
Construction:						
Coarse aggregate (+1 1/2 inch) 3/	257	1,730	W	W	W	W
Coarse aggregate, graded 4/	W	W	16,200	114,000	W	W
Fine aggregate (-3/8 inch) 5/	W	W	5,260	29,000	W	W
Coarse and fine aggregate 6/	W	W	10,800	57,200	W	W
Other construction materials	283	1,160	11	63	--	--
Agricultural 7/	W	W	--	--	--	--
Chemical and metallurgical 8/	W	W	--	--	W	W
Special 9/	W	W	--	--	--	--
Other miscellaneous uses and specified uses not listed	--	--	2	8	--	--
Unspecified: 10/						
Reported	3,960	23,400	2,660	16,100	11,000	65,500
Estimated	1,100	6,000	--	--	--	--
Total	22,700	129,000	35,700	226,000	18,100	96,400

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Excludes marble from total to avoid disclosing company proprietary data.

3/ Includes filter stone, riprap and jetty stone, and other coarse aggregate.

4/ Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), railroad ballast, and other graded coarse aggregate.

5/ Includes screening (undesignated), stone sand (bituminous mix or seal), stone sand (concrete), and other fine aggregate.

6/ Includes crusher run (select material or fill), graded road base or subbase, unpaved road surfacing, and other coarse and fine aggregate.

7/ Includes agricultural limestone.

8/ Includes cement manufacture.

9/ Includes mine dusting or acid water treatment, whiting or whiting substitute, and other fillers or extenders.

10/ Reported and estimated production without a breakdown by end use.

TABLE 5
GEORGIA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	3,050	$12,900	$4.24
Plaster and gunite sands	429	1,740	4.07
Concrete products (blocks, bricks, pipe, decorative, etc.)	71	547	7.70
Asphaltic concrete aggregates and other bituminous mixtures 2/	284	1,380	4.85
Unspecified: 3/			
Reported	1,460	4,930	3.36
Estimated	1,600	7,200	4.36
Total or average	6,940	28,700	4.13

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes fill.

3/ Reported and estimated production without a breakdown by end use.

TABLE 6
GEORGIA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

	Districts 1and 2		District 3	
Use	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products 2/	498	2,880	3,050	12,300
Asphaltic concrete aggregates and other bituminous mixtures 3/	7	51	278	1,330
Unspecified: 4/				
Reported	76	327	1,390	4,600
Estimated	380	1,700	1,300	5,500
Total	965	4,700	5,980	23,700

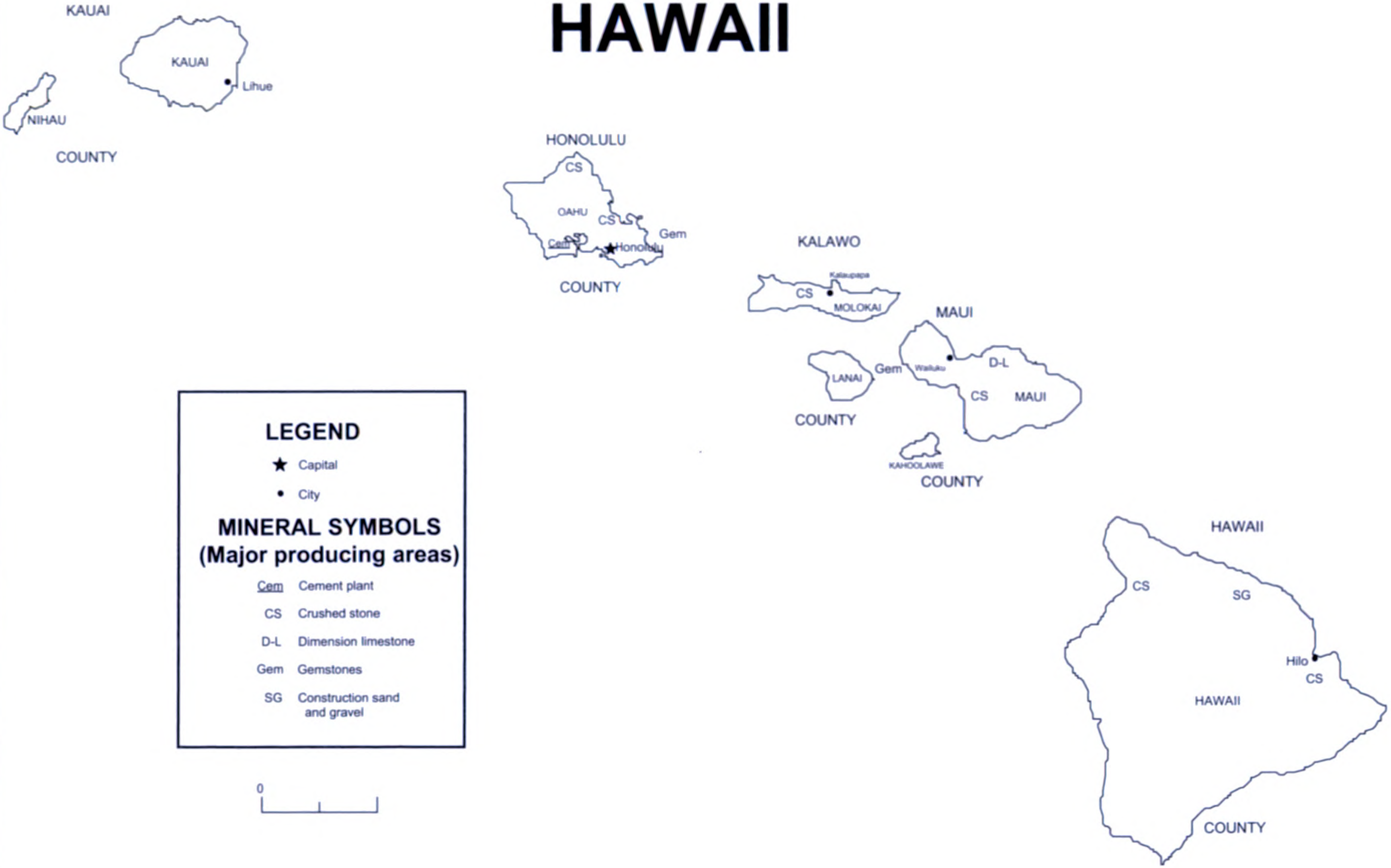
1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes plaster and gunite sands.

3/ Includes fill.

4/ Reported and estimated production without a breakdown by end use.

HAWAII



Source: Hawaii Division of Water and Land Development/U.S. Geological Survey (2001)

THE MINERAL INDUSTRY OF HAWAII

In 2001, the estimated value[1] of nonfuel mineral production for Hawaii was $70 million, based upon preliminary U.S. Geological Survey (USGS) data. This was about a 24% decrease from that of 2000[2] and followed a 6.5% increase from 1999 to 2000. Mining in Hawaii consisted mostly of the quarrying of stone to produce crushed stone and the extraction of sand and gravel from open pits, both for use by the construction industry. All of the State's portland cement, albeit from imported clinker, was produced at one grinding plant on the island of Oahu, Honolulu County.

The decrease in value in 2001 is mostly attributable to decreases in the values of portland cement and crushed stone (descending magnitude of change). A relatively small increase occurred in construction sand and gravel, while gemstones had a small decrease. In 2000, all nonfuel mineral commodities showed small to moderate increases in value (table 1).

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[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2001 USGS mineral production data published in this chapter are preliminary estimates as of August 2002 and are expected to change. For some mineral commodities, such as construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Specialist contact information may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals/contacts/comdir.html; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2] Values, percentage calculations, and rankings for 2000 may differ from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also change.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN HAWAII 1/ 2/

(Thousand metric tons and thousand dollars)

	1999		2000		2001 p/	
Mineral	Quantity	Value	Quantity	Value	Quantity	Value
Cement:						
Masonry	3	298 e/	3	645 e/	3 e/	600 e/
Portland	254	24,700 e/	286 e/	26,800 e/	110 e/	10,200 e/
Gemstones	NA	55	NA	(3/)	NA	77
Sand and gravel, construction	508	5,840	607	6,420	650	6,970
Stone, crushed	5,870	55,500	5,770	58,100	5,000	51,900
Total	XX	86,400	XX	92,000	XX	69,700

e/ Estimated. p/ Preliminary. NA Not available. XX Not applicable.
1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).
2/ Data are rounded to no more than three significant digits; may not add to totals shown.
3/ Value excluded to avoid disclosing company proprietary data.

TABLE 2
HAWAII: CRUSHED STONE SOLD OR USED, BY KIND 1/

	1999				2000			
Kind	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone	6	277	$2,580	$9.30	5	W	W	$8.66
Traprock	20	5,160 r/	49,400 r/	9.57 r/	16	5,010	$51,300	10.24
Volcanic cinder and scoria	1	W	W	W	--	--	--	--
Miscellaneous stone	3 r/	W	W	W	2	W	W	9.17
Total or average	XX	5,870	55,500	9.45	XX	5,770	58,100	10.08

r/ Revised. W Withheld to avoid disclosing company proprietary data; included in "Total." XX Not applicable. -- Zero.
1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

TABLE 3
HAWAII: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+1 1/2 inch):			
Filter stone	50	$705	$14.10
Other coarse aggregate	3	11	3.67
Total or average	53	716	13.51
Coarse aggregate, graded:			
Concrete aggregate, coarse	1,000	14,200	14.20
Bituminous aggregate, coarse	W	W	8.91
Other graded coarse aggregate	89	614	6.90
Total or average	1,090	14,900	13.61
Fine aggregate (-3/8 inch):			
Stone sand, concrete	304	4,340	14.28
Screening, undesignated	32	225	7.03
Other fine aggregate	121	1,210	9.98
Total or average	457	5,770	12.63
Coarse and fine aggregates:			
Graded road base or subbase	512	5,040	9.84
Crusher run or fill or waste	W	W	6.12
Other coarse and fine aggregates	374	2,330	6.24
Total or average	886	7,370	8.32
Other construction materials	38	455	11.97
Agricultural limestone	(3/)	(3/)	12.00
Other miscellaneous uses and specified uses not listed	(3/)	(3/)	21.25
Unspecified, estimated 4/	3,200	29,000	8.91
Total or average	5,770	58,100	10.08

W Withheld to avoid disclosing company proprietary data; included with "Other."

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Includes limestone, miscellaneous stone, and traprock.

3/ Withheld to avoid disclosing company proprietary data; included in "Total."

4/ Estimated production without a breakdown by end use.

TABLE 4
HAWAII: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	226	W	W
Plaster and gunite sands	1	W	W
Concrete products (blocks, bricks, pipe, decorative, etc.)	77	W	W
Asphaltic concrete aggregates and other bituminous mixtures	45	W	W
Road base and coverings	W	W	$12.13
Fill	116	$946	8.16
Other miscellaneous uses 2/	11	188	17.09
Filtration	3	W	W
Unspecified, estimated 3/	W	W	10.78
Total or average	607	6,420	10.57

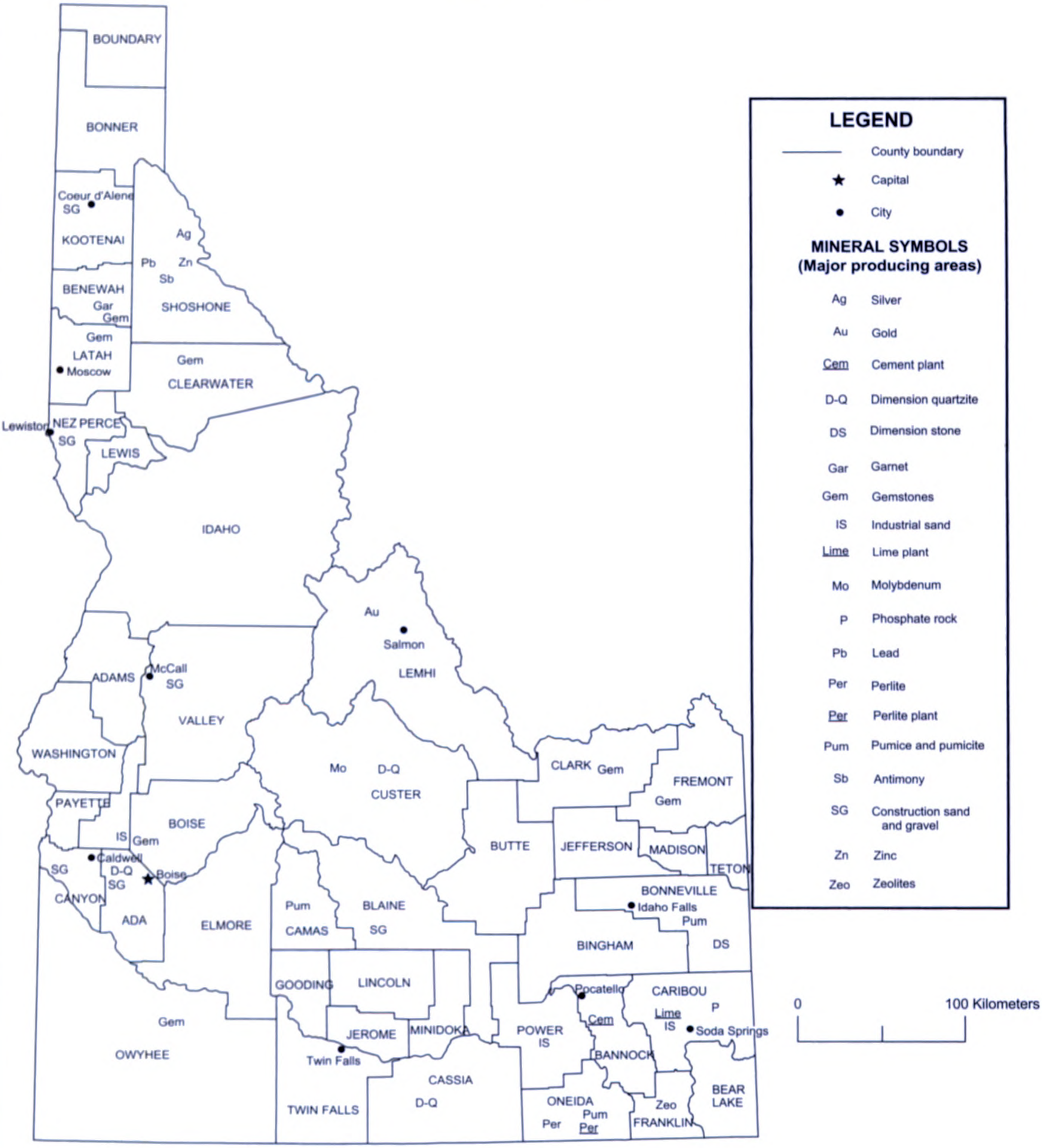
W Withheld to avoid disclosing company proprietary data; included in "Total."

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Includes plaster and gunite sands.

3/ Reported and estimated production without a breakdown by end use.

IDAHO



Source: Idaho Geological Survey/U.S. Geological Survey (2001)

THE MINERAL INDUSTRY OF IDAHO

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Idaho Geological Survey for collecting information on all nonfuel minerals.

In 2001, the estimated value[1] of nonfuel mineral production for Idaho was $346 million, based upon preliminary U.S. Geological Survey (USGS) data. This was a more than 3% decrease from that of 2000[2] and followed a 15.2% decrease from 1999 to 2000. The State decreased to 35th from 33d in rank among the 50 States in total nonfuel mineral production value, of which Idaho accounted for about 1% of the U.S. total.

Phosphate rock, construction sand and gravel, silver, portland cement, crushed stone, molybdenum concentrates, and lead were, by value, Idaho's leading nonfuel minerals. In 2001, there were significant decreases in the values of most metals, especially those of silver, gold, molybdenum concentrates, and lead (in descending order of change); zinc production and value was up slightly. The most significant changes for industrial minerals were increases in crushed stone, phosphate rock, and lime (table 1). All other changes were slight relative to these and had little effect on the overall total value.

In 2000, many commodities had decreases in value led by drops of approximately $25 million each in gold and phosphate rock; a withheld value in industrial sand and gravel (proprietary data); about $6 million in molybdenum; and values in a range of $3.7 million to about $2 million for crushed stone, silver, portland cement, and lime (descending order of change). The only significant increases were those of a $7.5 million rise in construction sand and gravel and a more than $1 million increase in industrial garnet (table 1).

Based upon USGS estimates of the quantities produced in the United States during 2001, Idaho remained the only State to produce antimony ore, first of three industrial-garnet-producing States, third in silver and lead (descending order of value), fourth in molybdenum and pumice, sixth in zinc and feldspar, and ninth in gold. While the State rose to second from third in phosphate rock and to seventh from eighth in gemstones, it dropped to sixth from fifth in zeolites. Additionally, the State was a significant producer of construction and industrial sand and gravel and dimension stone.

The Idaho Geological Survey[3] (IGS) provided the narrative information that follows. Production data in the following text are those reported by the IGS, based upon its own survey and estimates. The data differ from some production figures reported by the USGS. Idaho's mining industry suffered from the continuing low mineral commodity prices in 2001, as well as the economic recession and regulatory/environmental factors. Metal mining was especially hard hit. From 1998 to 2000, the percent of value contributed by industrial minerals rose from 50% to 59% due to metal mine closures and low metal prices. According to the Idaho Division of Financial Management, 2001 was "one of the toughest in recent memory for Idaho's mining and chemical sectors," and 2002 was projected to be as bad. Metal mining lost more than 1,000 jobs from 1997 to 2001. Mining employment dropped to 2,022 persons in 2001, a 16.6% drop from the previous year, and nonmetal mining became a larger employer than metal mining, which accounted for only 500 jobs by April 2002, according to the Idaho Department of Employment. Production of silver in the Silver Valley totaled approximately 255 metric tons (t), a significant decrease from the 401 t mined in 2000. Phosphate mining and processing remained the largest segment of Idaho's mineral industry, but it was not immune from lagging economic times. Most of the cutbacks there were recorded in the chemical industry, which lost more than 400 phosphate jobs at yearend.

Idaho's Coeur d'Alene District was one of the world's largest silver mining regions, with more than 31,000 t of silver produced from the Silver Valley. A chapter in Idaho and mining history ended on February 16, 2001, when the famous Sunshine Mine shut down. Its demise was hastened by closure of the East Helena, MT, smelter, low silver prices, and exhausted reserves. Since its discovery in 1884, the "Shine" produced more than 11,400 t of silver and considerable antimony and copper from a single underground mine. In little less than a month in 2001, the mine processed 17 t of silver before the remaining130 workers lost their jobs. Sunshine Mining Co. had been reorganized in bankruptcy court in 2000.

Hecla Mining Co.'s Lucky Friday silver-lead mine announced layoffs and production cuts in midyear to conserve the reserves. Only 50 workers remained, and production in 2001 was about 100 t of silver. The Galena Mine, owned by Coeur d'Alene Mines Corp., was able to increase production to 140 t of silver, a 12% rise from 2000. The company introduced mechanized diesel mining in selected stopes, installed a new sand backfill system, and was rehabilitating the Galena shaft. New geologic studies and more than 12,000 meters (m) of exploration drilling have resulted in substantial new reserves and exploration discoveries, such as the high-grade 117 vein.

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[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2001 USGS mineral production data published in this chapter are preliminary estimates as of August 2002 and are expected to change. For some mineral commodities, such as construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Specialist contact information may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals/contacts/comdir.html; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2] Values, percentage calculations, and rankings for 2000 may differ from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also change.

[3] Virginia S. Gillerman, Research Economic Geologist, authored the text of the State mineral industry information provided by the Idaho Geological Survey.

Thompson Creek Mining Co.'s large, open pit molybdenum mine in Custer County initiated a reduced work schedule with crews alternating between mining and running the mill. Approximately 72 employees remained, and production was about one-third of capacity as molybdenum prices remained low. Thompson Creek's higher value, lubricant-grade molybdenum production helped its bottom line.

Phosphate mining and processing was Idaho's largest mineral industry, although production declined to approximately 5 million metric tons (Mt) of ore, and market demand was down for fertilizer, a major use of the phosphoric acid produced from the ore. J.R. Simplot Co.'s Smoky Canyon Mine was the largest producer in 2001 with record production of more than 2.7 Mt, which went to their Don Acid Plant in Pocatello. The company was working on permits to expand northwards and was also drilling on its newly acquired Manning Canyon lease. Agrium Inc. mined approximately 1.4 Mt from the central portion of its Rasmussen Ridge Mine to supply ore for its fertilizer plant at Conda. Monsanto Co. was in the final stages of mining the South Pit at the Enoch Valley Mine and doing prestripping on its new South Rasmussen Ridge property. Monsanto's elemental phosphorus plant at Soda Springs remained at full production.

Astaris LLC's production from its Dry Valley Mine went to the large elemental phosphorus plant at Pocatello, but the company shut down two of its four electric furnaces early in the year, curtailing production and selling the power. In October, Astaris (a joint venture between FMC Corp. and Solutia, Inc.) shocked the city by announcing the yearend closure of the Pocatello plant, eliminating more than 400 jobs in 2001. Astaris and Agrium opened a new joint-venture plant in May at Conda. The new facility used the standard phosphoric acid product from Agrium's plant as feed and produced a wet-purified phosphoric acid (PPA), which can substitute for some of the uses of elemental phosphorus. The plant used evaporation, sulfidization, and solvent extraction circuits to purify and concentrate the phosphoric acid; it cost approximately $80 million and employed only 25 people.

Idaho's other new operation was the Bear River Zeolite Mine in Franklin County in the southeastern corner of the State. Located a few kilometers east of Preston, the small mine is operated by a subsidiary of U.S. Antimony Corp. The quarry accesses a large deposit of potassium-rich clinoptilolite; the material is crushed, sized, and bagged on site. It is sold for water filtration, soil amendments, environmental cleanup, and other uses.

Other industrial mineral mines generally had a good year, and the market demand for construction-related materials was excellent. The hot markets for decorative rock led to expansions and new operations. L and W Stone developed a second pit and purchased new haul trucks and an excavator at their seasonal Three Rivers Quarry near Clayton in Custer County. The seasonal operation supplied a prized, variably colored argillaceous quartzite.

In Cassia County, south of Oakley, at least four companies quarried Oakley Stone, the thin-splitting micaceous quartzite used as a facing and paving stone. Northern Stone Supply Inc. was the largest producer, and Oakley Valley Stone Inc., Snake River Quartzite, and American Stone & Building Inc. also operated.

Other producers included Overman's Western Stone in north Idaho, Idaho Travertine's quarry and cutting plant near Idaho Falls, Table Rock Sandstone of Boise, and Rockworks in Challis. The latter company used a homemade slide to collect lichen-covered talus.

Emerald Creek Garnet Co., a subsidiary of Western Garnet International Ltd., operated five wash plants to recover garnets from Emerald and Carpenter Creeks in north Idaho. Business was good, and past reclamation efforts were excellent, but permitting delays on its application to mine in the St. Maries River flood plain proved frustrating to the company. Idaho star garnet gemstones were also produced in the region.

Ash Grove Cement Co. had an excellent year, producing about 240,000 t of clinker at its plant at Inkom in Bannock County. Hess Pumice Products Inc. of Malad had a good year, producing pumice for grinding television screens; their subsidiary, U.S. Grout, was marketing an ultrafine pumice grout, useful in mining applications.

Only a few exploration projects were underway during 2001. In the Coeur d'Alene District of north Idaho, New Jersey Mining Co., a subsidiary of Mine Systems Design, drilled at the New Jersey Mine in the Coeur d'Alene District. Two core holes tested an induced polarization resistivity target and intersected a gold-bearing silicified zone at depth. A group of local Silver Valley businessmen formed Sullivan Mining and announced plans to construct a new 45,000-t hydrometallurgical zinc plant and to reopen the Bunker Hill Mine in Shoshone County. Extensive studies and permitting would be needed.

At the Rescue Mine near Warren, Barramundi Gold USA added a gold wheel and Wilfley table to the mill circuit. A six-man crew also developed 122 m of drift and raises and made safety improvements at the small underground mine. At the Daddy Del placer project on the South Fork of the Salmon River, operators dug five exploration pits on the high bench gravels west of Yellow Pine.

Alchemy Ventures Ltd. and subsidiary, Alchemy Kaolin, continued to evaluate the Helmar-Bovill clay district of Latah County. In the winter of 2000-01, Alchemy drilled 41 core holes totaling 2,100 m and took a bulk sample to test the clay and potential byproducts, silica and feldspar. The State Department of Lands has requested additional economic and feasibility information before extending the 16 exploration leases.

Formation Capital Corp. officially submitted its plan for a small underground cobalt-copper mine at its Idaho Cobalt project in Lemhi County. The submission activated the National Environmental Policy Act (NEPA) permitting process under the guidance of the Salmon National Forest. Baseline environmental monitoring and the necessary, multiple technical studies and meetings were underway during the year. The company also drilled large-diameter core for metallurgical testing and obtained an option on Sunshine Mining's hydrometallurgical facility at Kellogg. A resource update for the Idaho Cobalt project listed diluted proven and probable reserves at 1 Mt grading 0.625% cobalt, 0.49% copper, and 0.62 grams per metric ton gold.

Cleanup at the Bunker Hill Superfund site was in the final stages. The U.S. Environmental Protection Agency proposed expanding the "Superfund box" and cleanup to the entire Coeur d'Alene Basin, a move strongly opposed by local residents and State officials. Several smaller remediation projects have been successfully completed by local coalitions and agencies.

Reclamation efforts at most of Idaho's closed gold mines were progressing well. Meridian's Beartrack Mine was still recovering gold from the heap leach in Lemhi County. Black Pine Mining installed an innovative passive water-treatment system using iron filings and Hickenbottom drains to treat any future leachate from the valley fill pad in Cassia County. Hecla Mining, as well as Sunshine Mining, negotiated a settlement for cleanup liability in the Silver Valley and at Hecla's former Grouse Creek and Stibnite gold mines. Field inventories and remediation continued on "abandoned mine lands" projects on Federal and State land.

Selenium remained a serious concern in the Phosphate Reserve of southeastern Idaho, particularly after 150 sheep died after drinking from a spring near an old mine at Conda. Studies of the geochemistry of the phosphate horizons continued, and Idaho Department of Environmental Quality planned to lead an areawide risk assessment next year.

IGS, in cooperation with the USGS, published color geologic maps of the Boise Basin and Atlanta gold mining districts as a special map (M-7) and the Idaho City 100K sheet (GM-29), respectively. In cooperation with the USGS under the STATEMAP component of the USGS National Cooperative Geologic Mapping Program, IGS also released new geologic mapping in the Coeur d'Alene-Rathdrum, Moscow-Lewiston, Pocatello, and Sun Valley urban corridors and the digital St. Maries 100K sheet during 2001.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN IDAHO 1/ 2/

(Thousand metric tons and thousand dollars)

Mineral		1999		2000		2001 p/	
		Quantity	Value	Quantity	Value	Quantity	Value
Antimony	metric tons	450 r/	W	W	W	300	W
Garnet, industrial	do.	W	W	W	W	24,800	2,940
Gemstones		NA	368	NA	411	NA	W
Pumice and pumicite	metric tons	98,600	917	W	W	W	W
Sand and gravel:							
Construction		15,500	48,200	17,500	55,700	17,200	55,500
Industrial		711	11,200	W	W	W	W
Silver 3/	metric tons	416	70,100	416	66,900	W	W
Stone:							
Crushed		4,090 r/	18,500 r/	3,500	14,800	4,800	20,800
Dimension	metric tons	39,300	5,510	W	W	W	W
Zeolites	do.	--	--	(4/)	NA	(4/)	NA
Combined values of cement (portland), copper, feldspar, gold, lead, lime, molybdenum concentrates, perlite (crude), phosphate rock, stone [dimension, granite, quartz, sandstone (2000-01)], vanadium ore (1999), zinc, and values indicated by symbol W		XX	266,000 r/	XX	219,000r/	XX	267,000
Total		XX	421,000 r/	XX	357,000r/	XX	346,000

r/ Revised. p/ Preliminary. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined values" data.

XX Not applicable.

1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/ Data are rounded to no more than three significant digits; may not add to totals shown.

3/ Recoverable content of ores, etc.

4/ Withheld to avoid disclosing company proprietary data.

TABLE 2
IDAHO: CRUSHED STONE SOLD OR USED, BY KIND 1/

Kind	1999 Number of quarries	1999 Quantity (thousand metric tons)	1999 Value (thousands)	1999 Unit value	2000 Number of quarries	2000 Quantity (thousand metric tons)	2000 Value (thousands)	2000 Unit value
Limestone	8	1,020	$4,130	$4.06	6	607	$1,920	$3.16
Granite	7 r/	343 r/	1,280 r/	3.74 r/	7	240	975	4.06
Quartzite	6	574	4,090	7.12	5	495	2,020	4.07
Shell	1	12	87	7.25	2	17	107	6.29
Traprock	22	1,830	7,620	4.17	24	1,990	8,960	4.51
Miscellaneous stone	12 r/	320 r/	1,290 r/	4.03 r/	16	156	773	4.96
Total or average	XX	4,090 r/	18,500 r/	4.52 r/	XX	3,500	14,800	4.21

r/ Revised. XX Not applicable.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 3
IDAHO: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+1 1/2 inch):			
Riprap and jetty stone	34	$176	$5.18
Filter stone	11	74	6.73
Total or average	45	250	5.56
Coarse aggregate, graded:			
Concrete aggregate, coarse	W	W	5.30
Bituminous aggregate, coarse	237	1,180	4.99
Bituminous surface-treatment aggregate	61	477	7.82
Railroad ballast	W	W	9.22
Other graded coarse aggregate	116	636	5.48
Fine aggregate (-3/8 inch):			
Stone sand, concrete	68	750	11.03
Stone sand, bituminous mix or seal	(3/)	(3/)	(3/)
Screening, undesignated	59	228	3.86
Coarse and fine aggregates:			
Graded road base or subbase	425	1,750	4.11
Unpaved road surfacing	36	132	3.67
Terrazzo and exposed aggregate	64	298	4.66
Crusher run or fill or waste	122	435	3.57
Other coarse and fine aggregates	53	261	4.92
Total or average	700	2,870	4.11
Agricultural:			
Poultry grit and mineral food	16	56	3.50
Other agricultural uses	35	118	3.37
Total or average	51	174	3.41
Chemical and metallurgical:			
Cement manufacture	(4/)	(4/)	2.75
Flux stone	(4/)	(4/)	3.97
Special, mine dusting or acid water treatment	(4/)	(4/)	4.00
Unspecified: 5/			
Reported	923	3,730	4.04
Estimated	420	1,700	3.92
Total or average	1,350	5,400	4.01
Grand total or average	3,500	14,800	4.21

W Withheld to avoid disclosing company proprietary data; included with "Other."

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Includes granite, limestone, miscellaneous stone, quartzite, shell, and traprock.

3/ Less than ½ unit.

4/ Withheld to avoid disclosing company proprietary data; included in "Grand total."

5/ Reported and estimated production without a breakdown by end use.

TABLE 4
IDAHO: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	3,190	$12,700	$3.98
Plaster and gunite sands	43	111	2.58
Concrete products (blocks, bricks, pipe, decorative, etc.)	65	426	6.55
Asphaltic concrete aggregates and other bituminous mixtures	1,310	4,970	3.78
Road base and coverings 2/	5,820	18,300	3.14
Fill	787	2,060	2.62
Snow and ice control	131	696	5.31
Other miscellaneous uses 3/	294	1,140	3.88
Unspecified: 4/			
Reported	2,910	6,340	2.18
Estimated	3,000	9,000	3.02
Total or average	17,500	55,700	3.18

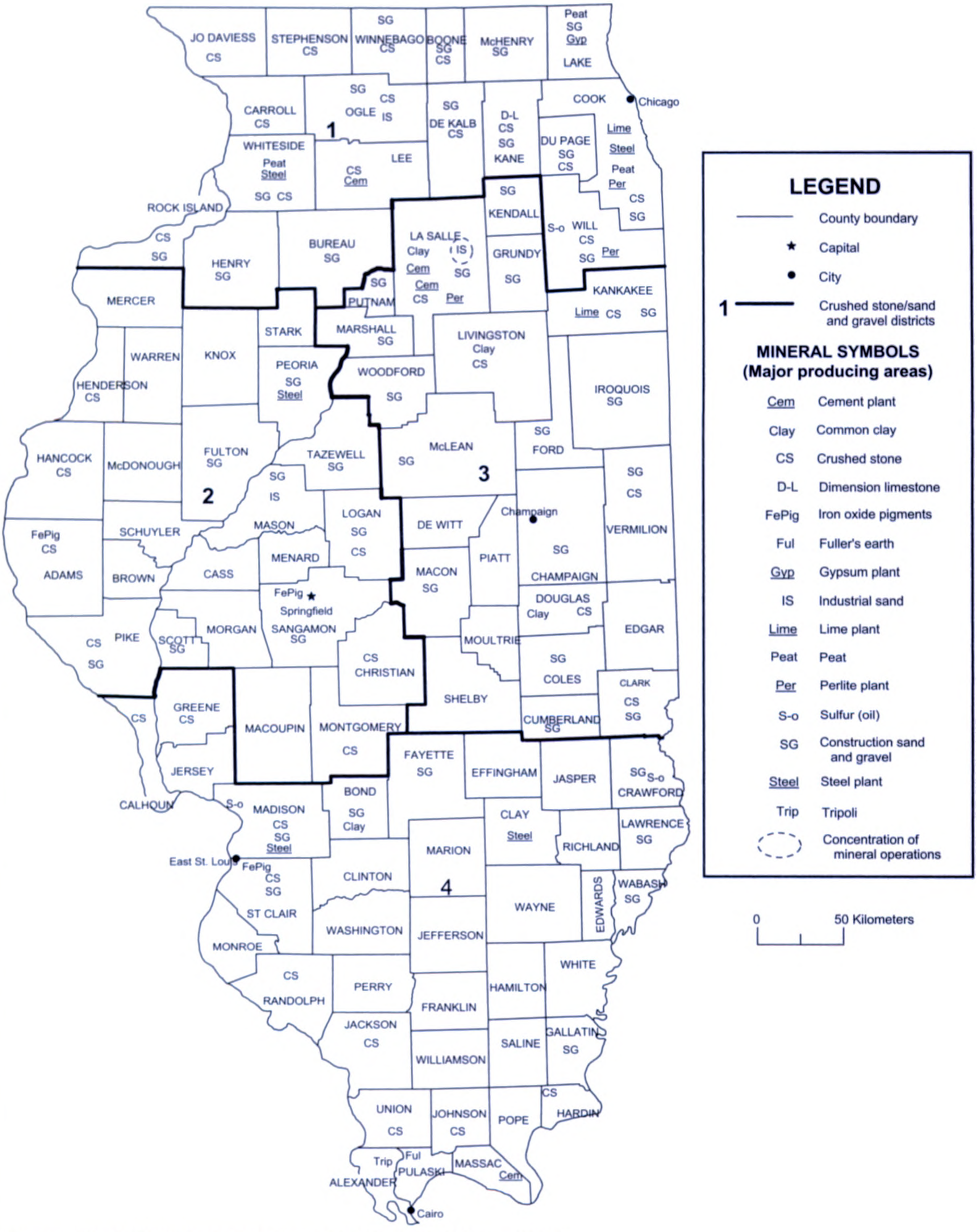
1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes road and other stabilization (cement).

3/ Includes railroad ballast.

4/ Reported and estimated production without a breakdown by end use.

ILLINOIS



Source: Illinois State Geological Survey/U.S. Geological Survey (2001)

THE MINERAL INDUSTRY OF ILLINOIS

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Illinois State Geological Survey for collecting information on all nonfuel minerals.

In 2001, the estimated value[1] of nonfuel mineral production for Illinois was $911 million, based upon preliminary U.S. Geological Survey (USGS) data. This was a marginal decrease from that of 2000[2] and followed a 1.6% increase from 1999 to 2000. For the third consecutive year, Illinois was 17th in rank among the 50 States in total nonfuel mineral production value, of which the State accounted for more than 2% of the U.S. total.

All of Illinois' total nonfuel mineral production value in 2001 resulted from the production of industrial minerals; no metals have been produced from mines in the State since 1996 when small quantities of copper, lead, silver, and zinc were produced. Crushed stone, by value, was the State's leading commodity, accounting for about 46% of the total, followed by portland cement with almost 25% and construction sand and gravel with about 14%. In 2001, increases in crushed stone and portland cement were not quite enough to offset decreases in fuller's earth, lime, and construction sand and gravel (descending order of change), resulting in the State's slight decrease in total nonfuel mineral value for the year. In 2000, rising values in fuller's earth (up more than $16 million), crushed stone (up $6 million), portland cement (up $3 million), plus smaller increases in lime, industrial sand and gravel, and common clays had more than offset decreases in construction sand and gravel, tripoli, and peat (descending order of change), resulting in the overall increase for the year (table 1).

Compared with USGS estimates of the quantities of minerals produced in the other 49 States in 2001, Illinois remained first in industrial sand and gravel, first among 4 States that produce tripoli, and fifth in crushed stone and peat. The State rose to 8th from 9th in lime and dropped to 4th from 3d in fuller's earth and to 10th from 9th in portland cement. In addition, Illinois continued to be a significant construction sand-and-gravel-producing State. Raw steel was produced in the State, but it was processed from materials obtained from other domestic and foreign sources. Illinois remained fifth in the Nation in the manufacture of raw steel with an output of 4.72 million metric tons, according to the American Iron and Steel Institute.

The following narrative information was provided by the Illinois State Geological Survey[3] (ISGS). The Illinois aggregate industry has faced a year of change and challenge. Increased construction generated by Illinois FIRST (the State's Fund for Infrastructure, Roads, Schools, and Transit) and the Illinois Coal Revival Initiative has created sharply increased demand for high-quality aggregate. At the same time, the rapid expansion of the suburban Chicago area has expropriated prime stone and sand-and-gravel reserves and has increased resistance to development of new pits and quarries. Improvements have continued in the industry: new uses are being sought for fines that are the byproduct of the crushed stone industry, wetland protection and mine reclamation efforts continue to see better results, new legislation has reduced unnecessary burdens on aggregate producers, and companies in the brick industry have continued to expand. Research has continued on developing the portable infrared mineral analyzer (PIMA) as a tool for quality control and exploration in the mining industry, on the feasibility of mining feldspar from Illinois dune sands, and on the benefits of the State's geologic mapping program.

The aggregate industry and Illinois Department of Transportation (IDOT) district engineers reported a significant increase in demand for construction aggregate in the State in 2001. In its second year, the Illinois FIRST construction program, a $12 billion, 5-year program sponsored by the Governor and passed by the General Assembly in 1999, resulted in increased construction and repair of roads, highways, bridges, and other transportation projects throughout the State. To upgrade critical infrastructure, the State allocated $2.3 billion for a highway improvement program for fiscal year 2001, which was 18% higher than the previous year's program and more than 200% higher than the appropriations in 1999 and earlier. The increased funding for the bond was generated by increases in passenger car registration fees and large-truck license fees.

According to IDOT's Fiscal Year 2001 Annual Report, Illinois' interstates are among the oldest in the Nation. Nearly 85% of the interstate system is at least 21 years old, past the 20-year design cycle when major rehabilitation and upgrade may be needed. The State highway system has an even higher percentage of roads built or reconstructed more than 20 years ago—nearly 96%. In 2001, a total of 2,670 kilometers of highway and 295 bridges were constructed or improved, and more than 55,000 private sector jobs were supported in the highway construction projects.

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[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2001 USGS mineral production data published in this chapter are preliminary estimates as of August 2002 and are expected to change. For some mineral commodities, such as construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Specialist contact information may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals/contacts/comdir.html; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2] Values, percentage calculations, and rankings for 2000 may differ from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also change.

[3] Zak Lasemi, Geologist, in collaboration with other members of the Industrial Minerals Section of the Illinois State Geological Survey, authored the text of the State mineral industry information provided by that State agency.

Increased demand is also expected for high-purity limestone as a result of the Illinois Coal Revival Initiative enacted in 2001. This initiative offers tax and other financial incentives to promote the construction and operation of new electrical generating plants using Illinois coal. Dozens of development prospects have surfaced, and two major companies have plans to build mine-mouth coal-fired powerplants. More high-purity limestone will be needed for the plants' flue gas desulfurization scrubbers. The ISGS has responded to numerous requests to help locate the necessary high-purity limestone.

In many parts of the State, especially in densely populated northeastern Illinois, it has been very difficult to open new pits or quarries because of intense public opposition and suburban expansion building over prime reserves of stone and sand and gravel. Northeastern Illinois is one of the largest producers and consumers of aggregates in the country and will likely remain so far into the future. Stone resources have historically been obtained locally from high-quality Silurian dolomites that occur at the bedrock surface throughout most of northeastern Illinois. Stone production grew by increasing production at large existing quarries. Ordovician rocks, which underlie the Silurian throughout the region, are becoming a significant potential source of stone as the accessible Silurian dolomite reserves continue to be depleted. The uppermost Ordovician (Maquoketa Group) consists primarily of shale, up to 91 meters thick, and forms the floor of the quarries in the overlying Silurian dolomites. Underlying the Maquoketa are the Galena and Platteville Groups, which are mostly dolomites and limestones up to 91 meters in thickness. In the 1970s, the first underground mine opened in these rocks attracted considerable interest in the Ordovician carbonates as a target for mining throughout the region. Plans to mine Ordovician rocks through underground mining or other methods accelerated in 2001. Elmer Larson LLC began stripping the thick Ordovician shale below the floor of its quarry near Sycamore (De Kalb County) in order to quarry the Galena Group dolomites. In Will County, Joliet Sand and Gravel Co. opened a new underground mine at its quarry near Joliet, and Vulcan Materials Co. continued with plans to develop an underground operation mining the Galena Group dolomites at its Lemont Quarry site. In addition, several sites under depleted gravel pits have been investigated that could be used to directly access the Galena by inclines constructed through the Maquoketa Shale.

Material Service Corp. reopened a sand and gravel pit at Channahon in Will County, but several other companies continued to battle for permission to expand existing pits and quarries or open new ones. U.S. Silica requested permits for expansion of its industrial sand mining operations to south of the Illinois River in Ottawa, IL (La Salle County). A 102-hectare (ha) site has received a permit for mining from the Illinois Department of Natural Resources, Office of Mines and Minerals. The plan includes construction of a tunnel under the river to transport the sand to its existing processing plant. Archeological and environmental concerns need to be addressed before proceeding with the mine expansion (Aubry, 2001§[4]). Monticello Inc. of Carol Stream requested that 107 ha east of Illinois 178 and north of the Illinois River in Utica, La Salle County, be rezoned from residential to heavy industrial for gravel mining. The issue was considered at several court hearings and remains unresolved. The agency that promotes tourism along the Illinois & Michigan Canal argued that added noise, dust, and truck traffic from the mine could discourage tourists (Feinman, 2001§). Grundy County issued an operating permit to a local sand and gravel mining company (Morris Sand & Gravel) near Morris. Issuing this permit has angered nearby residents who have been battling against the project for 3 years. The residents have filed a lawsuit that they hope will force the county to shut down the project (Pelkie, 2001§). The Metropolitan Water Reclamation District of Greater Chicago (MWRDGC) planned to sign contractual agreements with a mining company to have it extract and sell limestone/dolomite from the property, and the MWRDGC would subsequently use the open pit for temporary storage of storm water. To help the parties negotiate the terms of an agreement based on objective market information, the ISGS conducted a study that addressed the stone quality and reserves compared to existing nearby quarries and assessed potential economic benefits to the MWRDGC.

Companies mining aggregates are increasingly looking for ways to use their byproducts and overburden fines. The best use is in current products, but beyond this, companies are evaluating limestone and dolomite fines as agricultural amendments, fill and flowable fill, manufactured sand, underground utility markers, ceramics, foundry sand, portland cement raw materials, wastesite cover-barriers, and liquid and gaseous scrubbers and neutralizing agents for acid waste streams.

The aggregate industry continued cooperating with local and State agencies in protecting wetlands and by contributing to reclamation of mined-out sites. The State of Illinois bought 27 ha of wetland property in Lake County in the Hills Fen Nature Preserve in McHenry County. This allows the State to buffer or to preserve the rare wetland area. The preserve is a series of gravel hills overlooking a large complex of wetlands. The area is known for its scenic beauty, native grasses, and many rare wildflowers with 19 endangered or threatened species of plants and animals. Material Service Corp. voluntarily ceased mining sand and gravel at the site a year earlier to protect the preserve and donated more than 32 ha of land to establish the original nature preserve. In addition to selling the land, the company donated $2.5 million to the State (Sharp, 2001§).

A former gravel mine near Libertyville, Lake County, has been converted into a forest preserve park (Independence Grove Forest Preserve), which opened on June 2, 2001. The 445-ha preserve features a 47-ha lake and will offer the widest variety of recreational activities of any single Lake County preserve—including the only swimming beach on a forest preserve lake. The district first considered the gravel pit as a potential preserve in the 1970s. In 1982, the county purchased the site from Lake County Grading Co. in Libertyville and entered into a 15-year contract with the company. Under the agreement, Lake County Grading would continue mining until 1997 and, in return, would set aside a portion of its profits for the cost of preserving the site. The company had set aside $6.8 million for the project and agreed to complete about $8 million in earthmoving work for the project at no cost (Ryan, 2001).

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[4] References that include the section twist (§) are found in the Internet References Cited section.

The Illinois Association of Aggregate Producers (IAAP) partnered with the Illinois Environmental Protection Agency to create proposed air permitting rules for portable emission sources.

On January 11, 2001, the Governor signed into law Public Act 91-938, the IAAP's surface mining reform bill. The act makes three important changes in Illinois' surface mining laws. It increases the aggregate surface mine permit term from 3 to 10 years. The 10-year permit term promotes more efficient mining and will allow operators to permit larger tracts of land.

Second, the law creates a formal permit transfer procedure that promotes the orderly transfer of mine properties while ensuring that no gap in reclamation bond coverage occurs.

Finally, the law prohibits local governments from requiring reclamation bonds for mines already bonded by the State and ends the double bonding requirement. A local government cannot require a mining company that has a State reclamation bond to submit another bond for the same tract of land.

The IAAP Safety Committee initiated a "Rock Solid Safety" Awards Program to publicly recognize IAAP members who set high safety and health standards in the conduct of their operations. Illinois had zero nonmetal industry fatalities for 2001—the first time this has happened since 1995.

IAAP and IDOT have increased preregulation "partnering" on a number of issues. Two important recent efforts were skid resistant testing (variable speed friction test) for aggregates in the asphalt top layer in roads and a new aggregate gradation control system. The latter program was established through joint IAAP-IDOT working groups, and it mandates specifications and certified wet screen particle-size analyses for a number of crushed stone products. For skid-resistance measurements, IDOT chose a circular tire tester of polishing rates of limestones, dolomites, gravels, sandstones-quartzites, slags, and related materials. These test data were used with Illinois traffic density maps to establish limits on the amount of limestone, dolomite, and crushed gravel in high-traffic asphalt roads. Generally, twice as much dolomite as limestone can be used, and a higher friction material must form the rest of the mix. Gravels vary according to their composition, but many in northern Illinois are dolomitic. These and other IAAP-IDOT efforts are increasingly aimed at creating practical and realistic specifications for current and planned 30- to 40-year roads and bridges and at finding adequate high-quality aggregate supplies for these structures.

Moline Consumers Co., a privately held company with crushed stone, sand and gravel, ready-mixed concrete and building materials operations in Illinois, Iowa, and Missouri, announced its new corporate name—RiverStone Group, Inc.

Glen-Gerie Brick Co. completed the purchase of Global Clay Products at Marseilles, IL. Global had recently completed a second tunnel kiln to double its capacity to more than 100 million bricks per year. Richards Brick Co. near East St. Louis has just about completed replacing its beehive periodic kilns with a continuous tunnel kiln. If operated continuously, modern, computer-controlled tunnel kilns reduce labor and energy costs, provide more uniform firing, and generally use less plant space. Colonial Brick Co. in Cayuga, IN, continues to operate the only beehive kilns in the region, and it will probably continue to take advantage of the batch mode, variable production rate, and customized firing that are possible with the periodic kilns.

The ISGS, in cooperation with the University of Illinois Department of Natural Resources and Environmental Sciences and the Illinois Clean Coal Institute, has demonstrated the use of fly ash in making fired bricks. The fly ash is produced as a byproduct in the combustion of coal. It is estimated that the Illinois brick industry could use up to about 360,000 metric tons per year of fly ash. The team is currently working with utilities and brick companies to perform full-scale commercial demonstrations at several brick companies.

Research has continued in the field of industrial minerals in Illinois. Recent projects include developing procedures for using the PIMA for product quality control and exploration in the aggregate mining industry and for other applications, for investigating the feasibility of using Illinois dune sand as a feldspar resource, and for assessing the economic benefits of detailed geologic mapping. The ISGS has begun a multiyear study to explore the applications of the PIMA for industrial minerals research and development and for routine mine planning and quality control at mine sites. The PIMA's one-analysis-per-minute speed, lack of sample preparation, and customized standards libraries suggest many applications. Current focus is on analysis of impurities in aggregates for roadways, ceramic clay deposits, mining byproducts, and mineral standards that match Illinois deposits better than the PIMA's standards. The ISGS has demonstrated that round or sawed cores, hand specimens, powders, and thin sections with or without a cover slip can be analyzed. The PIMA's 1.25-centimeter analysis window makes it possible to analyze very small features that are lost in bulk analyses.

The ISGS report entitled "Feldspar and Quartz from the Dunes of Kankakee, Illinois" presents flow diagrams and a preliminary economic analysis of potential uses of the sand in glass, ceramics, and foundry industries (Bhagwat and others, 2001). In bulk sand or as a flotation separate, the feldspar in the sand could replace feldspar for glass and ceramics manufacture that currently must be imported from North Carolina or Canada.

The ISGS's Special Report 3, Economic Benefits of Detailed Geologic Mapping to Kentucky, has been released. This study, carried out in cooperation with the Kentucky Geological Survey, estimated the value of geologic maps as a "public good" to society (Bhagwat and Ipe, 2000). A statistical survey of 2,200 map users indicated that the economic benefits of having detailed 7.5-minute geologic maps available outweighed the cost of the mapping program by a ratio of at least 25:1. The public is generally unaware of the fundamental importance of geologic information although it is vital to all planning and public health in modern industrial environments. This lack of awareness leads to a reluctance to invest taxpayer money in the generation of geologic information and in making it available in the form of maps. Kentucky was chosen for the study because it is the only major State to have completed mapping of the entire State at 1:24,000 scale. The ISGS study of the economic value of Kentucky's detailed geologic maps to its users demonstrated the benefits of the detailed geologic mapping program now underway in Illinois in identifying water and mineral resources, protecting its environment, and improving the quality of life for its citizens.

References Cited

Bhagwat, S.B., Hughes, R.E., Masters, J.M., and DeMaris, P.J., 2001, Feldspar and quartz from the dunes of Kankakee, Illinois—A preliminary feasibility study: Illinois State Geological Survey, Illinois Minerals 122, 29 p.

Bhagwat, S.B., and Ipe, V.C., 2000, Economic benefits of detailed geologic mapping to Kentucky: Illinois State Geological Survey, Special report 3, 39 p.

Ryan, N., 2001, New preserve worth the wait: Chicago Tribune/Metro, June 20, p. 1

Internet References Cited

Aubry, A., 2001 (July 12), U.S. Silica seeking to expand, Ottawa Daily Times, accessed July 12, 2001, at URL http://www.ottawadailytimes.com/news/story.php?storyid=1717.

Feinman, M., 2001 (March 1), Quarry attorney objects to Utica attorney's questions, Ottawa Daily Times, accessed March 1, 2001, at URL http://www.ottawadailytimes.com/news/odtnews/news2.htm.

Pelkie, C. B., 2001 (May 16), Sand pit permit attacked, Chicago Herald News, accessed May16, 2001, at URL http://www.suburbanchicagonews.com/archives/heraldnews/2001/20010516_78.htm.

Sharp, J.S., 2001 (January 3), State buys wetland parcel near fen, Suburban Chicago Daily Herald, accessed January 3, 2001, at URL http://www.dailyherald.com/mchenry/main_story.asp?intID=3689460.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN ILLINOIS 1/ 2/

(Thousand metric tons and thousand dollars)

	1999		2000		2001 p/	
Mineral	Quantity	Value	Quantity	Value	Quantity	Value
Cement, portland	2,940	215,000 e/	2,860	218,000 e/	2,940 e/	224,000 e/
Clays, common	134	616	200	905	200	910
Gemstones	NA	8	NA	8	NA	8
Sand and gravel:						
Construction	34,100	147,000	30,300	132,000	29,500	130,000
Industrial	4,460	71,100	4,430	71,600	4,430	71,600
Stone, crushed 3/	76,900 r/	388,000 r/	76,000	394,000	78,000	417,000
Combined values of clays (fuller's earth), lime, peat, stone (crushed sandstone), tripoli	XX	77,000	XX	96,200	XX	67,600
Total	XX	899,000	XX	913,000	XX	911,000

e/ Estimated. p/ Preliminary. r/ Revised. NA Not available. XX Not applicable.

1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/ Data are rounded to no more than three significant digits; may not add to totals shown.

3/ Excludes certain stones; value included with "Combined values" data.

TABLE 2
ILLINOIS: CRUSHED STONE SOLD OR USED, BY KIND 1/

	1999				2000			
Kind	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone 2/	128 r/	60,800 r/	$310,000 r/	$5.09 r/	119	58,600	$307,000	$5.23
Dolomite	23	16,200	78,800	4.87	17	17,400	87,600	5.05
Sandstone	1	W	W	W	1	W	W	W
Total or average	XX	76,900 r/	388,000 r/	5.05	XX	76,000	394,000	5.19

r/ Revised. W Withheld to avoid disclosing company proprietary data. XX Not applicable.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes limestone-dolomite reported with no distinction between the two.

TABLE 3
ILLINOIS: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+1 1/2 inch):			
Macadam	1,050	$6,500	$6.18
Riprap and jetty stone	297	3,300	11.12
Filter stone	487	2,700	5.54
Other coarse aggregate	228	1,130	4.97
Total or average	2,060	13,600	6.61
Coarse aggregate, graded:			
Concrete aggregate, coarse	6,400	41,500	6.49
Bituminous aggregate, coarse	3,900	29,700	7.62
Bituminous surface-treatment aggregate	1,260	8,740	6.91
Railroad ballast	377	2,190	5.81
Other graded coarse aggregate	1,310	5,030	3.84
Total or average	13,200	87,200	6.58
Fine aggregate (-3/8 inch):			
Stone sand, concrete	7.23	3,410	4.72
Stone sand, bituminous mix or seal	237	1,150	4,84
Screening, undesignated	992	3,590	3.62
Other fine aggregate	71	342	4.82
Total or average	2,020	8,490	4.20
Coarse and fine aggregates:			
Graded road base or subbase	10,300	49,300	4.77
Unpaved road surfacing	3,150	14,600	4.64
Crusher run or fill or waste	239	1,130	4.74
Other coarse and fine aggregates	1,320	5,180	3.93
Total or average	15,000	70,200	4.67
Other construction materials	805	5,520	6.85
Agricultural:			
Agricultural limestone	1,610	6,370	3.95
Other agricultural uses	19	73	3.84
Total or average	2,040	8,810	4.31
Chemical and metallurgical:			
Cement manufacture	W	W	7.89
Dead-burned dolomite manufacture	W	W	4.95
Special, other fillers or extenders	W	W	5.66
Other miscellaneous uses and specified uses not listed	W	W	7.08
Unspecified: 3/			
Reported	24,900	119,000	4.78
Estimated	13,000	60,000	4.63
Total or average	37,800	179,000	4.73
Grand total or average	76,000	394,000	5.19

W Withheld to avoid disclosing company proprietary data; included in "Grand total."

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Includes dolomite, limestone, and limestone-dolomite; excludes sandstone to avoid disclosing company proprietary data.

3/ Reported and estimated production without a breakdown by end use.

TABLE 4
ILLINOIS: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE AND DISTRICT 1/ 2/

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3		District 4	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Construction:								
Coarse aggregate (+1 1/2 inch) 3/	1,400	9,090	51	367	250	2,190	365	1,980
Coarse aggregate, graded 4/	W	W	W	W	W	W	W	W
Fine aggregate (-3/8 inch) 5/	W	W	W	W	W	W	W	W
Coarse and fine aggregate 6/	9,700	45,400	343	1,940	2,270	11,300	2,730	11,500
Other construction materials	785	5,420	--	--	5	19	14	81
Agricultural 7/	592	1,930	106	556	395	1,910	537	2, 040
Chemical and metallurgical 8/	W	W	--	--	W	W	--	--
Special 9/	--	--	W	W	--	--	--	--
Other miscellaneous uses and specified uses not listed	--	--	--	--	--	--	W	W
Unspecified: 10/								
Reported	14,400	68,000	2,300	11,000	1,450	6,810	6,760	33,200
Estimated	3,300	15,000	2,200	11,000	2,800	14,000	4,500	20,000
Total	40,500	214,000	5,560	27,500	12,600	73,200	17,300	79,700

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes dolomite, limestone, limestone-dolomite; excludes sandstone to avoid disclosing company proprietary data.

3/ Includes filter stone, macadam, riprap and jetty stone, and other coarse aggregate.

4/ Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), railroad ballast, and other graded coarse aggregate.

5/ Includes stone sand (concrete), stone sand (bituminous mix or seal), screening (undesignated), and other fine aggregate.

6/ Includes crusher run (select material or fill), graded road base or subbase, unpaved road surfacing, and other coarse and fine aggregates.

7/ Includes agricultural limestone and other agricultural uses.

8/ Includes cement manufacture and dead-burned dolomite manufacture.

9/ Includes other fillers or extenders.

10/ Reported and estimated production without a breakdown by end use.

TABLE 5
ILLINOIS: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	5,670	$25,600	$4.51
Plaster and gunite sands	436	1,960	4.50
Concrete products (blocks, bricks, pipe, decorative, etc.)	495	2,480	5.01
Asphaltic concrete aggregates and other bituminous mixtures	887	3,590	4.05
Road base and coverings	3,730	18,400	4.94
Road and other stabilization (cement and lime)	181	705	3.90
Fill	1,850	6,830	3.69
Snow and ice control	15	73	4.87
Other miscellaneous uses 2/	67	515	7.69
Unspecified: 3/			
Reported	9,410	39,800	4.23
Estimated	7,600	32,000	4.22
Total or average	30,300	132,000	4.35

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes filtration, railroad ballast, and roofing granules.

3/ Reported and estimated production without a breakdown by end use.

TABLE 6
ILLINOIS: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3		District 4	
Use	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate (including concrete sand)	1,940	8,930	1,080	4,760	2,190	10,500	467	1,530
Concrete products (blocks, bricks, pipe, decorative, etc.) 2/	407	2,010	W	W	399	2,000	W	W
Asphaltic concrete aggregates and other bituminous mixtures	718	2,690	W	W	W	W	W	W
Road base and coverings 3/	2,390	11,800	309	1,320	923	4,690	285	1,280
Fill	W	W	391	1,130	W	W	129	403
Other miscellaneous uses 4/	849	3,880	183	791	598	2,330	81	224
Unspecified: 5/								
Reported	6,640	28,600	1,590	7,720	1,180	3,480	--	--
Estimated	3,100	13,000	640	2,700	1,800	7,200	2,000	8,800
Total	16,000	71,200	4,190	18,300	7,110	30,200	3,010	12,200

W Withheld to avoid disclosing company proprietary data; included with "Other miscellaneous uses." -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

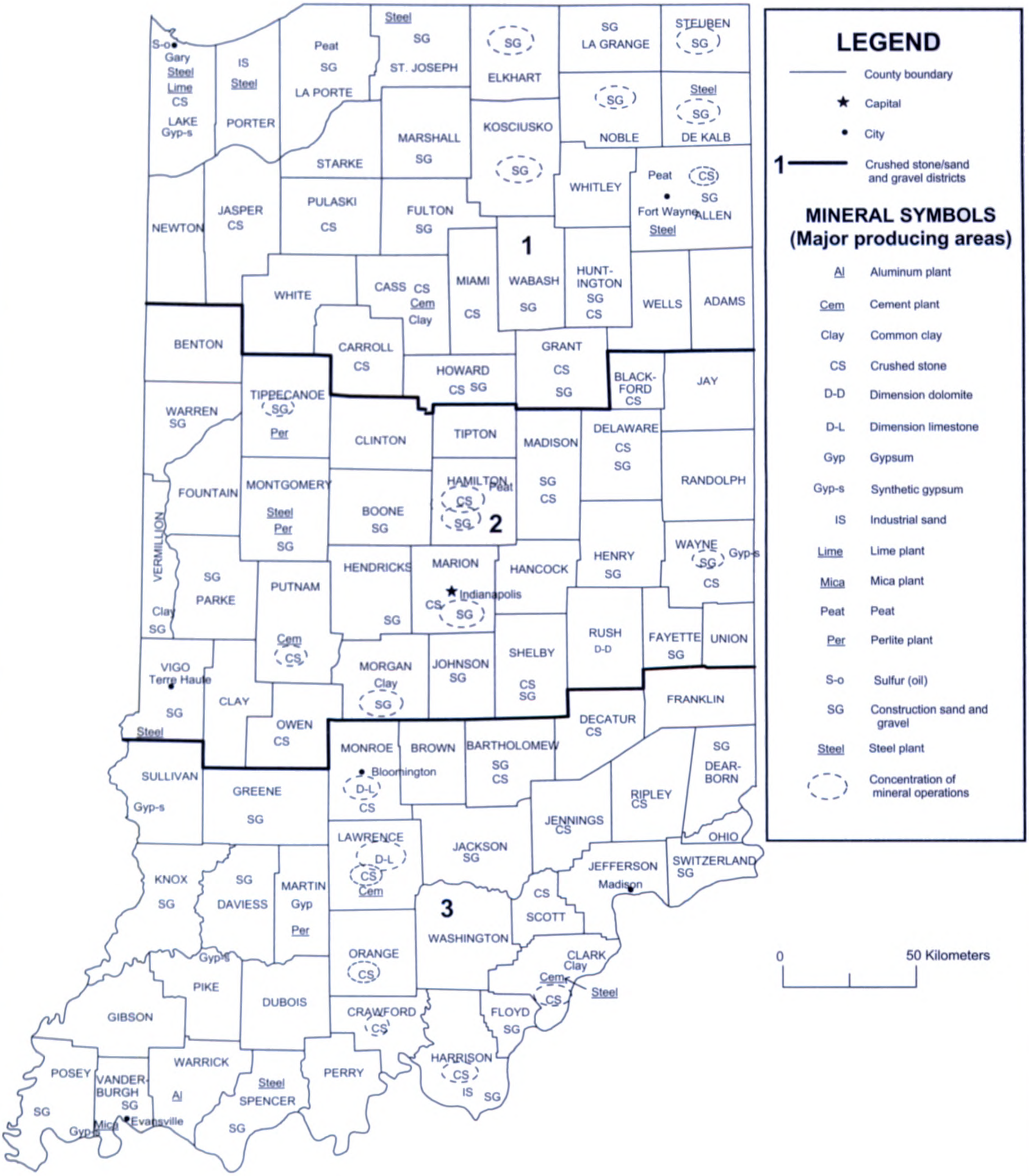
2/ Includes plaster and gunite sands.

3/ Includes road and other stabilization (cement and lime).

4/ Includes filtration, railroad ballast, roofing granules, and snow and ice control.

5/ Reported and estimated production without a breakdown by end use.

INDIANA



Source: Indiana Geological Survey/U.S. Geological Survey (2001)

THE MINERAL INDUSTRY OF INDIANA

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Indiana Geological Survey for collecting information on all nonfuel minerals.

In 2001, the estimated value[1] of nonfuel mineral production for Indiana was $718 million, based upon preliminary U.S. Geological Survey (USGS) data. This was more than a 3% increase from that of 2000[2] and followed a 2.9% decrease from 1999 to 2000. The State rose in rank to 20th from 22d among the 50 States in nonfuel mineral production value, of which Indiana accounted for close to 2% of the U.S. total. Indiana's increase in nonfuel mineral value in 2000 resulted mostly from the rising values of crushed stone and portland and masonry cements, further supported by smaller increases in construction sand and gravel and dimension stone. Both gypsum and lime production and values were down slightly. In 2000, a $17 million drop in the value of crushed stone, a $5 million decrease in construction sand and gravel, and about a $4 million drop in lime led to the State's decrease for the year. These decreases were countered somewhat by increases in cement (portland and masonry) and gypsum; common clay and peat were also up slightly (descending order of change) (table 1). Compared with USGS estimates of the quantities of minerals produced in the other 49 States during 2001, Indiana remained first in dimension stone and fourth in peat; it was one of the top five masonry cement-producing States and it continued to be eighth in lime. The State rose to 8th from 10th in the production of gypsum and was a significant producer of portland cement, crushed stone, construction sand and gravel, and common clays, ranking 11th, 13th, 13th, and 14th, respectively. The State's mines exclusively produced industrial minerals and coal; all raw steel and primary aluminum produced in the State were processed from materials received from other domestic and foreign sources. Indiana continued to lead the Nation in the production of raw steel, with an estimated output of about 21 million metric tons of raw steel, as reported by the American Iron and Steel Institute. Based upon USGS annual data, the State remained third in the production of primary aluminum.

The following narrative information was provided by the Indiana Geological Survey[3] (IGS). The U.S. Mine Safety and Health Administration (MSHA) reported that 3,704 individuals were employed in the Indiana nonfuel mining sector during 2001; this was a 2.7% decrease from 2000. Mulzer Crushed Stone, Inc.'s Rockport Plant at Tell City received a 2000 Sentinels of Safety Exceptional Safety Record award in the dredging category for 109,762 hours without a lost-time injury. The award was sponsored by MSHA and the National Mining Association. The National Stone, Sand & Gravel Association presented a Safety Award for the year 2000 to Rogers Group, Inc.'s Greene County Plant for 36 years (10,000 days) without a lost-time accident or fatality.

The Indiana Department of Transportation (INDOT) completed highway construction projects valued at $737 million during 2001, achieving a new State record. Northeast Indiana benefited from $8 million awarded by the Federal Government in December for airport and other transportation projects. In addition, INDOT awarded $18.3 million for 34 Transportation Enhancement Activity awards in July. The Federally funded projects are related to transportation but are not highway projects, and include bicycle/pedestrian paths and trails, revitalization or construction of new commerce areas, and restoration of historic bridges and historic commerce areas. A purpose and need statement was released on Interstate 69 (I-69), supporting the need for an interstate linking Indianapolis to Evansville. About $5 million for an I-69 environmental study was approved as part of the Senate version of the Federal transportation appropriations bill that went to a conference committee. The number of routes under consideration for the extension was narrowed from 14 to 5. A final route will be selected by late 2002, but it may take 2 more years to decide on a site for an I-69 bridge to cross the Ohio River at Evansville. A Web site was set up to provide information to the public and is available on the Internet at URL http://www.i69in-ky.com. Evansville requested $30 million in Federal funds to cover planning for the bridge and for an I-69 route around the city. A draft Environmental Impact Statement (EIS) evaluating nine sites for the Ohio River Bridges Project was released in November. This project would build two new bridges across the Ohio River in the Jeffersonville, IN/Clarksville, IN, and Louisville, KY, regions. Increased landing fees and rental rates along with a tentative agreement with airlines on a long-term lease should fund much of the cost for a new $890 million airport terminal at the Indianapolis International Airport. Completion of the project has been delayed until 2007 to allow airline companies more time to procure funds. A $390 million Gary-Chicago Airport expansion project received Federal approval. The Princeton, IN, Toyota plant continued planning for an $800 million expansion. Eli Lilly and Co. planned to expand three buildings in its Indianapolis complex at a total cost of $55.5 million. The company also planned to start construction, totaling $35 million, on two new buildings in Indianapolis in the spring. A $100 million addition is being planned for the Central Library in Indianapolis.

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[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity. All 2001 USGS mineral production data published in this chapter are preliminary estimates as of August 2002 and are expected to change. For some mineral commodities, such as construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Specialist contact information may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals/contacts/comdir.html; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2] Values, percentage calculations, and rankings for 2000 may differ from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also change.

[3] Kathryn R. Shaffer, Minerals Statistician, authored the text of State mineral industry information provided by the Indiana Geological Survey.

There were developments in Indiana's crushed stone industry during 2001. Martin Marietta Aggregates planned to reopen an undeveloped portion of the long-abandoned Standard Materials Corp. quarry site at Waldron in Shelby County. The company also planned to process and to sell the sand and gravel overburden before developing the quarry. A joint venture between J.W. Jones Co. and Martin Marietta Aggregates acquired two existing crushed stone quarries owned by J.W. Jones Co. Martin Marietta Aggregates planned to manage both. The joint venture renamed the two quarries the Gosport Quarry and Putnam Quarry; the former is in Owen County and the latter is in Putnam County. Rogers Group, Inc. acquired Blackwell Moore, Inc., which produced crushed stone from overburden at the Indiana Limestone Co., Inc.'s Crown Quarry and planned to continue to produce crushed stone at the Bloomington Crown Quarry. The Indiana Limestone Co., Inc. planned to continue to produce dimension limestone from the quarry. Mulzer Crushed Stone, Inc. applied to rezone 81 hectares at its New Amsterdam Quarry in Harrison County. No new crushed stone quarries opened during the year, and only one crushed stone quarry, Hanson Aggregates Midwest Region's Woodburn Quarry in Allen County, closed during 2001.

The dimension limestone industry had a stable year. Development continued at the new StarStone Co., Inc. Patton Hill Quarry near the town of Oolitic in Lawrence County. The quarry opened in 2000 in response to the forced idling of the company's Hunter Valley Quarry in Monroe County because of prolonged highway improvements. Independent Limestone Co. in Monroe County was selected to produce about 425 cubic meters of stone for the Pentagon reconstruction project. Bybee Stone Co. of Ellettsville cut, detailed, and shipped the stone. Most of the original stone came from the Indiana Limestone Co. in Lawrence County during the 1940s.

The Indiana sand and gravel industry continued to experience strong product demand that resulted in the opening of several new pits: Jerry R. Riddle Gravel Co., Inc., Riddle Sand and Gravel, Madison County; Kokomo Gravel, Inc., Peru Plant, Miami County; W.R. Beach, Inc., W.R. Beach Sand & Gravel, Marion County; Jack Owen Construction, Noble County; and Mishawaka Recycle, St. Joseph County. Noblesville Landfill, Inc. also sold sand and gravel from the Noblesville landfill site in Hamilton County. Dredging at the former Martin Marietta Aggregates Utica site on the Ohio River in Clark County continued as part of the construction of a planned barge facility for Nugent Sand Co. Nugent Sand Co. operated pits at Bethlehem in Clark County and at Columbus in Bartholomew County, and shipped material to company-owned facilities in Kentucky. The aforementioned joint venture between J.W. Jones Co. and Martin Marietta Aggregates planned to acquire a sand and gravel operation at Waverly, Morgan County, owned by J.W. Jones Co. and to rename it Five Points Sand. Martin Marietta Aggregates encountered delays in attempting to expand its River Road sand and gravel operation in Hamilton County, which is in the urbanized Carmel area north of Indianapolis. Other companies acquired two Martin Marietta Aggregates sand and gravel operations. The Roskovensky Concrete & Gravel, (also called Roskovensky Sand & Gravel) acquired the Clinton Plant in Vermillion County. The Terre Haute pit in Vigo County acquired the neighboring S&G Excavating, Inc., and combined the pit with its existing South Pit. Cox Materials, Inc.'s Plants 1 and 2 in Morgan and Hancock Counties, respectively, acquired Indiana State Materials LLC. Purdy Materials Inc. in Tippecanoe County planned to move to an approved nearby area when the present reserves will be exhausted in about 3 years. The company received zoning approval to continue producing sand and gravel near the city of Lafayette for the next 20 years. Krafft Gravel, Inc., Spencerville Pit, DeKalb County; M. R. Gravel, Hancock County; and Vulcan Materials Co., Battle Ground Sand and Gravel, Tippecanoe County, all closed during the year.

Activities in other industrial minerals industries included the following. Unimin Corp. acquired the Huntingburg Plant in Clay County from United Clays, Inc. The company produced fine-ground clay and limestone, talc and talc blend, and purchased all raw materials. The KPT, Inc. tile company at Bloomfield closed because of increased competition and decreased profitability of the plant. Two peat producers, Filbrun Peat Moss, Madison County, and Hyponex Corp., Hamilton County, stopped production. Hyponex, however, continued to sell peat produced at other Indiana locations.

The Indiana Water Pollution Control Board approved new ground water rules. In May 2001, a State law was passed that stipulates that the Indiana Solid Waste Management Board may not regulate the legitimate production, transportation, storage, processing or use of slag created as a byproduct of iron and steel production. In December, the State considered new standards for using slag in road construction following the leaching of an unpleasant smelling fluid from I-65 in Lake County. This resulted from repairs and improvements in October that had used slag as fill material. INDOT conducted public meetings around the State in September to discuss present and future transportation plans for the State. Morgan County experienced a boom in recent years in the development of sand and gravel operations. This has resulted in problems with truck traffic and damage to much traveled county roads. As a result, an agreement was reached whereby Morgan County gravel producers will negotiate with county commissioners on ways that the producers can help make county road improvements on Madison Township roads traveled by gravel trucks.

In 2001, approximately 150 aggregate operations were enrolled in an environmental stewardship program for pits and quarries in the State, a program established by the Indiana Mineral Aggregates Association (IMAA) with assistance from the Indiana Geological Survey (IGS). The IGS, in association with the IMAA, mapped locations of active industrial mineral-producing mine sites in Indiana. The IGS, in collaboration with Bernardin, Lochmueller & Associates, Inc. completed elements of a geographic information system portrayal of southwestern Indiana as part of the EIS for the proposed I-69 extension. The IGS continued its ongoing research on Salem Limestone to understand its formation, distribution, and potential as a petroleum reservoir; this study should benefit both the dimension stone and petroleum industry. Mapping studies of abandoned underground limestone mines were conducted in Clark County. The IGS completed an initial study of the origins and remediation of pad marks that form on the surface of milled dimension stone stacked at job sites. In cooperation with the USGS under the STATEMAP component of the USGS National Cooperative Geologic Mapping Program, a project to map bedrock geology of the north-central Heartlands area and the bedrock geology in the Indianapolis quadrangle at a scale of 1:100,000 continued. During 2001, IGS published three maps related to the STATEMAP project (Hasenmueller and James, 2001a, b, c), a computer database of physical testing data for Indiana building stones (Hill, Hasenmueller, and Frushour, 2001), and a directory of industrial mineral producers (Shaffer, 2001); a compact disk of the directory was in production. Databases on ctive and abandoned pits and quarries and stone testing were also being compiled.

Legislation that would redefine passenger vehicles to include pickup trucks, a change that would alter the amount that several counties could receive in State highway funds, was introduced and referred to committee. State legislation that could have provided extra funds for Indiana highway maintenance and construction by raising gasoline taxes did not pass. The U.S. Army Corps of Engineers continued to conduct a study to develop a 60-year navigation plan for the Ohio River. Most of the 19 locks on the river are 40 to 50 years old, and some are even older.

Hanson Aggregates Midwest Region, Harding Street, was 1 of 31 aggregate mines selected nationwide by MSHA to monitor air quality for diesel particulate matter. A Purdue doctoral student developed a lightweight portland cement mixture that cures at subfreezing temperatures, a development that could be useful to the construction industry.

Cheap imported steel continued to exacerbate financial problems for the steel industry. LTV Steel Corp., operating under Chapter 11, received approval from a bankruptcy court in December to cease operations so that it is better prepared to sell the company. The company planned to continue its efforts to acquire $250 million in Federally-guaranteed emergency loans or to find a buyer. The State awarded $7.4 million in loans to the East Chicago area to compensate for lost property tax income. Ispat Inland Inc. and other East Chicago taxpayers may find its taxes increased to offset the loss of taxes caused by the LTV Corp. closure. Indiana Workforce Development Services reported that this was the largest closure occurring at one time in the State's history. Bethlehem Steel and U.S. Steel absorbed most of LTV Corp.'s customers. The two companies were planning to raise steel prices from 7% to 9% because of the closing and because of declining foreign imports. Three companies toured LTV Corp.'s plants in Indiana and Illinois in July, fueling speculation that they might be interested in purchasing them.

Bethlehem Steel Corp., which operated a mill at Burns Harbor, IN, filed for Chapter 11 bankruptcy protection in October. Primary reasons given for the insolvency were negative effects on the market of high-volume steel imports, expensive employee retirement programs, and rising labor costs. It also blamed a fall in the market following the September 11 tragedy. This is the fifth steel producer with mills in the State to file for bankruptcy; the others are Heartland Steel at Terre Haute, Qualitech Steel SBQ at Pittsboro, LTV Corp. at East Chicago, and Republic Technologies International LLC at Gary. Burns Harbor (Porter County) faced a possible significant shortfall in tax income because of the bankruptcy. Porter County will receive $3 million in State loans and $6.3 million in advanced school system tuition payments; however, the total additional shortfall will be about $21 million.

United States Steel Corp. also suffered losses during the year. To improve operating efficiency, it considered a merger with Bethlehem Steel, Wheeling-Pittsburgh Steel, a fourth unnamed company, and additional unnamed partners. The merger would create a company capable of producing 27 million metric tons per year, almost double U.S. Steel's current production of 15 million metric tons. Antitrust issues are not likely to be a factor since the new company would probably produce less than 25% of the Nation's steel. The Gary Works planned to build a dewatering facility for environmental reasons.

Heartland Steel in Terre Haute, Vigo County, filed for Chapter 11 protection in January. The company was purchased by Companhia Siderugica Nacional (CSN), a Brazilian steel company, for $55 million. CSN had some concern for its future ability to bring steel into the country for processing at the plant because of restrictions that could be placed on foreign imports by the International Trade Commission. Qualitech Steel in Pittsboro, also operating under Chapter 11 bankruptcy protection, announced that the plant planned to close until a buyer could be found; Qualitech Steel hired an investment bank to find a buyer. The plant has flow-control problems, but the company stated that it had a plan for fixing them. Ispat Inland Inc. in East Chicago needed to make repairs to its plant but was unable to do so for financial reasons. An expansion project at Eagle Steel Products Inc. that included a new building and equipment will receive funding through the sale of $7.75 million in tax-free bonds, which the Jeffersonville City Council approved in October.

Alcoa, Inc. and Praxair, Inc., Newburgh, received a Governor's Award for Excellence in Pollution Prevention presented by the Indiana Department of Environmental Management for developing a production method that reduces natural gas consumption by 45%, nitrogen oxides emissions by 50%, and waste metal generation by 85%.

References Cited

Hasenmueller, W.A., and James, C.L., 2001a, Reconnaissance map showing elevation of the bedrock surface in the Indianapolis 30 x 60 minute quadrangle, central Indiana: Indiana Geological Survey Open-File Studies, OFS01-32.

Hasenmueller, W.A., and James, C.L., 2001b, Reconnaissance map showing thickness of unconsolidated deposits in the Indianapolis 30 x 60 minute quadrangle, central Indiana: Indiana Geological Survey Open-File Studies, OFS01-33.

Hasenmueller, W.A. and James, C.L., 2001c, Reconnaissance bedrock geologic map of the Indianapolis 30 x 60 minute quadrangle, central Indiana: Indiana Geological Survey Open-File Studies, OFS01-34.

Hill, J.R., Hasenmueller, W.A., and Frushour, S.S., 2001, Physical testing data for Indiana Limestone and other building stone materials—A computer database: Indiana Geological Survey Occasional Paper 66.

Shaffer, K.R., 2001, Directory of industrial mineral producers in Indiana: Indiana Geological Survey Directory 11, 67 p.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN INDIANA 1/ 2/

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral	1999		2000		2001 p/	
	Quantity	Value	Quantity	Value	Quantity	Value
Cement, portland	2,510	178,000 e/	2,630	179,000 e/	2,860 e/	195,000 e/
Clays, common	752	1,480	639	1,560	639	1,560
Gemstones	NA	3	NA	3	NA	3
Sand and gravel:						
Construction	29,500	126,000	27,900	121,000	28,200	124,000
Industrial	175	1,860	W	W	W	W
Stone:						
Crushed 3/	58,800 r/	270,000 r/	55,400	253,000	56,000	264,000
Dimension metric tons	255,000	33,500	235,000	32,400	254,000	33,800
Combined values of cement (masonry), gypsum (crude), lime, peat	XX	106,000	XX	108,000	XX	99,100
Total	XX	716,000	XX	695,000	XX	718,000

e/ Estimated. p/ Preliminary. NA Not available. r/ Revised. W Withheld to avoid disclosing company proprietary data; value included with "Combined values" data. XX Not applicable.

1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/ Data are rounded to no more than three significant digits; may not add to totals shown.

3/ Excludes certain stones; kind and value included with "Combined values" data.

TABLE 2
INDIANA: CRUSHED STONE SOLD OR USED, BY KIND 1/

Kind	1999				2000			
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone 2/	74 r/	45,400 r/	$208,000 r/	$4.57 r/	64	44,200	$205,000	$4.63
Dolomite	20	12,900	59,600	4.62	19	W	W	W
Slate	1	477	2640	5.53	1	W	W	W
Total or average	XX	58,800 r/	270,000 r/	4.59	XX	55,400	253,000	4.57

r/ Revised. W Withheld to avoid disclosing company proprietary data; included in "Total." XX Not applicable.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes limestone-dolomite reported with no distinction between the two.

TABLE 3
INDIANA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+1 1/2 inch):			
Macadam	138	$834	$6.04
Riprap and jetty stone	720	4,020	5.58
Filter stone	369	1,820	4.92
Other coarse aggregate	496	2,540	5.12
Total or average	1,720	9,210	5.34
Coarse aggregate, graded:			
Concrete aggregate, coarse	4,000	19,200	4.81
Bituminous aggregate, coarse	2,840	14,100	4.97
Bituminous surface-treatment aggregate	1,810	7,670	4.24
Railroad ballast	115	653	5.68
Other graded coarse aggregate	1,500	8,260	5.52
Total or average	10,300	50,000	4.87
Fine aggregate (-3/8 inch):			
Stone sand, concrete	W	W	7.15
Stone sand, bituminous mix or seal	330	1,920	5.83
Screening, undesignated	198	817	4.13
Other fine aggregate	332	2,260	6.80
Total or average	860	5,000	5.81
Coarse and fine aggregates:			
Graded road base or subbase	3,490	16,800	4.83
Unpaved road surfacing	1,480	7,040	4.76
Terrazzo and exposed aggregate	W	W	7.13
Crusher run or fill or waste	545	2,350	4.30
Lightweight aggregate (slate)	W	W	5.83
Other coarse and fine aggregates	4,700	20,400	4.34
Total or average	10,200	46,600	4.56
Other construction materials	29	190	6.55
Agricultural:			
Agricultural limestone	1,050	5,460	5.19
Poultry grit and mineral food	(3/)	(3/)	3.66
Chemical and metallurgical:			
Cement manufacture	3,580	14,600	4.09
Dead-burned dolomite manufacture	(3/)	(3/)	5.48
Flux stone	(3/)	(3/)	4.14
Sulfur oxide removal	1,290	4,640	3.60
Special:			
Whiting or whiting substitute	(3/)	(3/)	11.18
Other fillers or extenders	(3/)	(3/)	11.67
Unspecified: 4/			
Reported	20,900	92,500	4.42
Estimated	5,000	23,000	4.52
Total or average	25,900	115,000	4.44
Grand total or average	55,400	253,000	4.57

W Withheld to avoid disclosing company proprietary data; included with "Other."

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Includes dolomite, limestone, limestone-dolomite, and slate.

3/ Withheld to avoid disclosing company proprietary data; included in "Grand total."

4/ Reported and estimated production without a breakdown by end use.

TABLE 4
INDIANA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1 1/2 inch) 2/	531	2,750	179	1,040	1,010	5,420
Coarse aggregate, graded 3/	2,010	10,400	783	4,720	7,470	34,800
Fine aggregate (-3/8 inch) 4/	338	1,840	W	W	W	W
Coarse and fine aggregate 5/	5,070	20,600	1,570	7,580	3,580	18,400
Other construction materials	--	--	29	190	--	--
Agricultural 6/	W	W	W	W	458	1,960
Chemical and metallurgical 7/	W	W	W	W	3,520	13,600
Special 8/	W	W	--	--	W	W
Unspecified: 9/						
Reported	5,490	24,500	10,500	46,100	4,950	21,800
Estimated	1,300	5,700	1,000	4,500	2,700	12,000
Total	16,200	73,200	15,000	69,200	24,100	111,000

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes filter stone, macadam, riprap and jetty stone, and other coarse aggregate.

3/ Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), railroad ballast, and other graded coarse aggregates.

4/ Includes stone sand (bituminous mix or seal), stone sand (concrete), screening (undesignated), and other fine aggregate.

5/ Includes crusher run (select material or fill), graded road base or subbase, lightweight aggregate (slate), terrazzo and exposed aggregate, unpaved road surfacing, and other coarse and fine aggregates.

6/ Includes agricultural limestone and poultry grit and mineral food.

7/ Includes cement manufacture, dead-burned dolomite manufacture, flux stone, and sulfur oxide removal.

8/ Includes whiting or whiting substitute and other fillers or extenders.

9/ Reported and estimated production without a breakdown by end use.

TABLE 5
INDIANA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	5,720	$21,000	$3.68
Concrete products (blocks, bricks, pipe, decorative, etc.) 2/	319	1,870	5.87
Asphaltic concrete aggregates and other bituminous mixtures	1,130	4,610	4.09
Road base and coverings	910	4,250	4.67
Road stabilization (cement)	266	642	2.41
Fill	1,570	4,940	3.14
Snow and ice control	206	631	3.06
Other miscellaneous uses 3/	102	536	5.25
Unspecified: 4/			
Reported	12,100	59,700	4.94
Estimated	5,500	22,000	4.03
Total or average	27,900	121,000	4.33

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes plaster and gunite sands.

3/ Includes filtration.

4/ Reported and estimated production without a breakdown by end use.

TABLE 6
INDIANA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate (including concrete sand)	1,910	6,560	1,900	9,340	1,900	5,150
Concrete products (blocks, bricks, pipe, decorative, etc.) 2/	149	536	57	583	113	753
Asphaltic concrete aggregates and other bituminous mixtures	575	2,610	271	966	281	1,030
Road base and coverings 3/	409	1,930	W	W	W	W
Fill	432	1,230	1,040	3,440	104	268
Snow and ice control	111	332	84	274	11	25
Other miscellaneous uses 4/	83	428	722	2,630	62	441
Unspecified: 5/						
Reported	45	288	9,960	51,600	2,100	7,870
Estimated	3,100	12,000	1,400	6,100	1,100	4,500
Total	6,760	25,700	15,400	74,800	5,650	20,000

W Withheld to avoid disclosing company proprietary data; included with "Other miscellaneous uses."

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

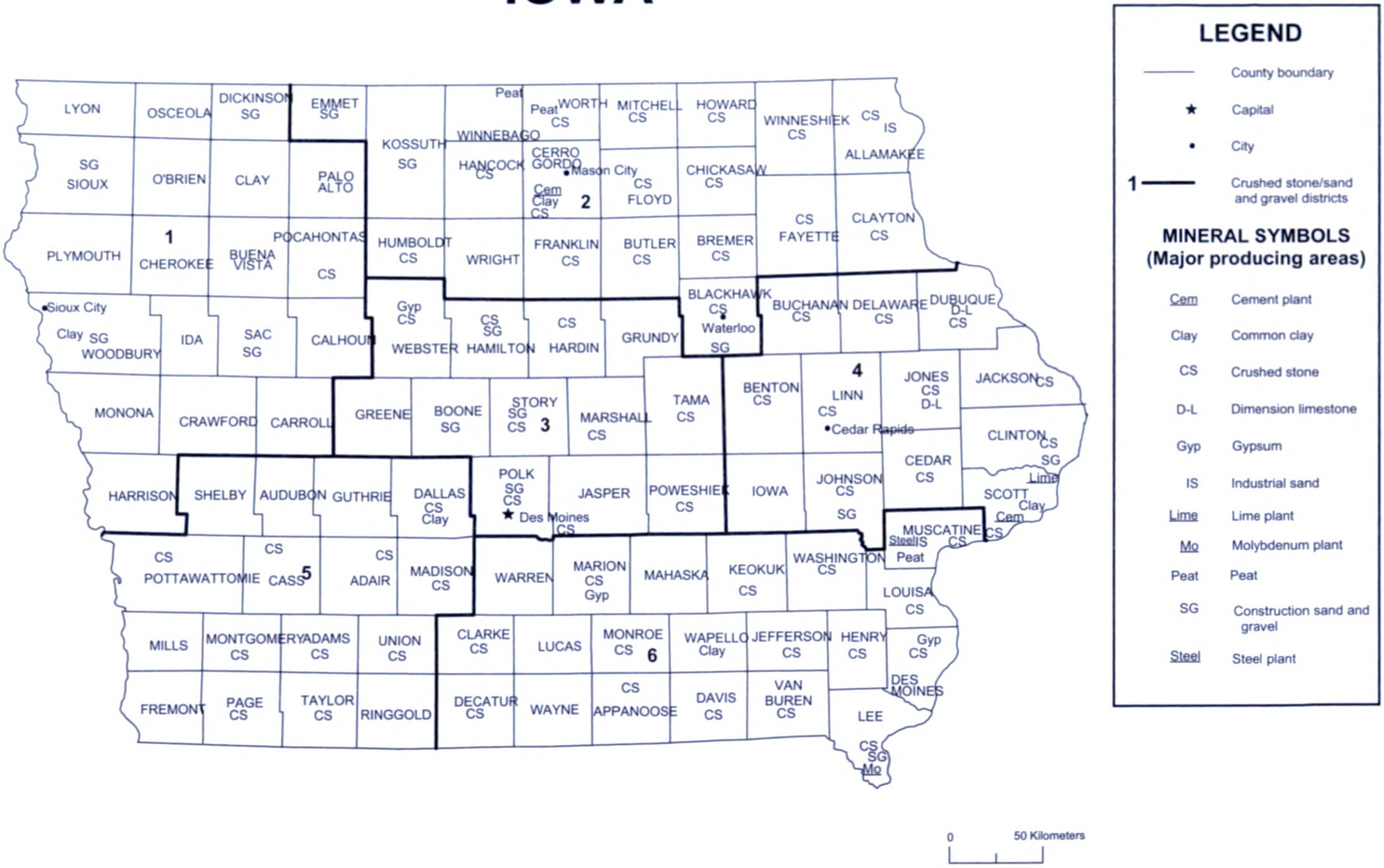
2/ Includes plaster and gunite sands.

3/ Includes road and other stabilization (cement).

4/ Includes filtration.

5/ Reported and estimated production without a breakdown by end use.

IOWA



Source: Iowa Geological Survey and Land Quality Bureau/U.S. Geological Survey (2001)

THE MINERAL INDUSTRY OF IOWA

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Iowa Geological Survey and Land Quality Bureau for collecting information on all nonfuel minerals.

In 2001, the estimated value[1] of nonfuel mineral production for Iowa was $487 million, based upon preliminary U.S. Geological Survey (USGS) data. This was about a 3% decrease from that of 2000[2] and followed a 4.6% increase in 2000 from that of 1999. The State was 31st (28th in 2000) in rank among the 50 States in total nonfuel mineral production value, of which Iowa accounted for more than 1% of the U.S. total.

Crushed stone, cement (portland and masonry), construction sand and gravel, and gypsum, in descending order of value, were Iowa's leading nonfuel mineral commodities in 2001, accounting for about 95% of the State's total nonfuel mineral value. In 2000, a more than $9 million increase in portland cement, a $6 million rise in crushed stone, plus smaller yet significant increases in lime and gypsum offset a $6.5 million decrease in construction sand and gravel, leading to the State's $22 million rise in value for the year. Increases also occurred in masonry cement, peat, and common clay, while gemstones was unchanged, and industrial sand and gravel was down slightly (table 1).

Compared with USGS preliminary estimates of quantities produced in the other 49 States in 2001, Iowa remained second in crude gypsum and was a significant producer of crushed stone, portland cement, and construction sand and gravel (descending order of value). No metals were mined in Iowa; all of the State's metal production, such as raw steel, resulted from the processing of materials acquired from other domestic and foreign sources.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN IOWA 1/ 2/

(Thousand metric tons and thousand dollars)

Mineral	1999 Quantity	1999 Value	2000 Quantity	2000 Value	2001 p/ Quantity	2001 p/ Value
Clays, common	302	1,040	306	1,060	306	1,060
Gemstones	NA	2	NA	2	NA	2
Sand and gravel:						
Construction	13,500	60,600	12,300	54,100	13,300	59,400
Industrial	W	W	29	W	32	W
Stone, crushed	40,200 r/	203,000 r/	40,200	209,000	38,000	204,000
Combined values of cement, gypsum (crude), lime, peat, and values indicated by symbol W	XX	216,000	XX	239,000	XX	223,000
Total	XX	481,000	XX	503,000	XX	487,000

p/ Preliminary. r/ Revised. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined values" data. XX Not applicable.

1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/ Data are rounded to no more than three significant digits; may not add to totals shown.

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[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2001 USGS mineral production data published in this chapter are preliminary estimates as of August 2002 and are expected to change. For some mineral commodities, such as construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Specialist contact information may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals/contacts/comdir.html; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2] Values, percentage calculations, and rankings for 2000 may differ from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also change.

TABLE 2
IOWA: CRUSHED STONE SOLD OR USED, BY KIND 1/

Kind	1999 Number of quarries	1999 Quantity (thousand metric tons)	1999 Value (thousands)	1999 Unit value	2000 Number of quarries	2000 Quantity (thousand metric tons)	2000 Value (thousands)	2000 Unit value
Limestone 2/	206 r/	W	W	W	205	W	W	W
Dolomite	1 r/	W	W	W	1	W	W	W
Total or average	XX	40,200 r/	$203,000 r/	$5.05 r/	XX	40,200	$209,000	$5.20

r/ Revised. W Withheld to avoid disclosing company proprietary data; included in "Total." XX Not applicable.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes limestone-dolomite reported with no distinction between the two.

TABLE 3
IOWA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+1 1/2 inch):			
Macadam	169	$835	$4.94
Riprap and jetty stone	90	711	7.90
Filter stone	171	1,313	7.68
Other coarse aggregate	78	546	7.00
Total or average	508	3,410	6.70
Coarse aggregate, graded:			
Concrete aggregate, coarse	1,060	8,320	7.88
Bituminous aggregate, coarse	332	2,540	7.64
Bituminous surface-treatment aggregate	150	1,050	7.01
Railroad ballast	W	W	6.82
Other graded coarse aggregate	41	245	5.98
Total or average	1,580	12,200	7.70
Fine aggregate (-3/8 inch):			
Stone sand, concrete	W	W	3.86
Stone sand, bituminous mix or seal	73	505	6.92
Screening, undesignated	113	441	3.90
Other fine aggregate	16	67	4.19
Total or average	202	1,010	5.01
Coarse and fine aggregates:			
Graded road base or subbase	1,530	11,400	7.47
Unpaved road surfacing	3,270	19,100	5.85
Crusher run or fill or waste	182	676	3.71
Other coarse and fine aggregates	236	1,770	7.51
Total or average	5,220	33,000	6.33
Other construction materials	220	2,140	9.71
Agricultural:			
Agricultural limestone	716	2,920	4.08
Poultry grit and mineral food	W	W	3.52
Other agricultural uses	282	1,030	3.65
Total or average	998	3,950	3.96
Chemical and metallurgical:			
Cement manufacture	(3/)	(3/)	3.55
Lime manufacture	(3/)	(3/)	4.69
Flux stone	(3/)	(3/)	6.35
Special, asphalt fillers or extenders	(3/)	(3/)	16.00
Unspecified: 4/			
Reported	16,500	82,000	4.97
Estimated	12,000	60,000	4.96
Total or average	28,600	142,000	4.97
Grand total or average	40,200	209,000	5.20

W Withheld to avoid disclosing company proprietary data; included with "Other."

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Includes dolomite, limestone, and limestone-dolomite.

3/ Withheld to avoid disclosing company proprietary data, included in "Grand total."

4/ Reported and estimated production without a breakdown by end use.

TABLE 4
IOWA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3		District 4	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Construction:								
Coarse aggregate (+1 1/2 inch) 2/	--	--	157	782	W	W	W	W
Coarse aggregate, graded 3/	--	--	515	3,510	W	W	W	W
Fine aggregate (-3/8 inch) 4/	--	--	103	435	--	--	59	302
Coarse and fine aggregate 5/	--	--	W	W	W	W	1,720	11,600
Other construction materials	--	--	124	928	--	--	97	1,120
Agricultural 6/	--	--	W	W	W	W	169	623
Chemical and metallurgical 7/	--	--	W	W	W	W	W	W
Special: 8/	--	--	--	--	--	--	W	W
Unspecified: 9/								
Reported	1,090	5,400	2,160	11,000	4,910	24,300	3,640	18,000
Estimated	--	--	2,500	12,000	--	--	3,200	19,000
Total	1,090	5,400	8,990	44,600	5,420	27,000	11,700	63,300

Use	District 5		District 6		Unspecified districts	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1 1/2 inch) 2/	--	--	119	889	--	--
Coarse aggregate, graded 3/	--	--	203	1,770	--	--
Fine aggregate (-3/8 inch) 4/	--	--	40	276	--	--
Coarse and fine aggregate 5/	--	--	1,380	10,000	--	--
Other construction materials	--	--	--	--	--	--
Agricultural 6/	--	--	137	624	--	--
Chemical and metallurgical 7/	--	--	--	--	--	--
Special: 8/	--	--	--	--	--	--
Unspecified: 9/						
Reported	850	4,220	2,210	11,000	1,630	8,080
Estimated	5,700	28,000	640	3,200	--	--
Total	6,590	32,700	4,730	27,800	1,630	8,080

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes filter stone, macadam, riprap and jetty stone, and other coarse aggregate.

3/ Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), railroad ballast, and other graded coarse aggregate.

4/ Includes screening (undesignated), stone sand (bituminous mix or seal), stone sand (concrete), and other fine aggregate.

5/ Includes crusher run (select material or fill), graded road base or subbase, roofing granules, unpaved road surfacing, and other coarse and fine aggregates.

6/ Includes agricultural limestone, poultry grit and mineral food, and other agricultural uses.

7/ Includes cement manufacture, flux stone, and lime manufacture.

8/ Includes asphalt fillers or extenders.

9/ Reported and estimated production without a breakdown by end use.

TABLE 5
IOWA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	2,860	$13,400	$4.67
Plaster and gunite sands	58	316	5.45
Concrete products (blocks, bricks, pipe, decorative, etc.)	36	225	6.25
Asphaltic concrete aggregates and other bituminous mixtures	904	2,920	3.23
Road base and coverings	1,870	5,420	2.90
Fill	627	2,060	3.29
Snow and ice control	75	323	4.31
Roofing granules	2	22	11.00
Other miscellaneous uses	46	399	8.67
Unspecified: 2/			
Reported	2,480	14,400	5.80
Estimated	3,300	15,000	4.38
Total or average	12,300	54,100	4.40

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Reported and estimated production without a breakdown by end use.

TABLE 6
IOWA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate (including concrete sand)	480	2,080	509	2,530	332	1,620
Concrete products (blocks, bricks, pipe, decorative, etc.) 2/	23	102	W	W	W	W
Asphaltic concrete aggregates and other bituminous mixtures	340	907	W	W	W	W
Road base and coverings 3/	674	2,090	477	1,290	635	1,820
Fill	150	577	104	382	79	204
Snow and ice control	29	100	27	128	W	W
Other miscellaneous uses 4/	5	28	321	1,600	325	1,030
Unspecified: 5/						
Reported	858	6,350	291	1,450	878	4,500
Estimated	370	1,400	260	1,000	2,300	10,000
Total	2,930	13,600	1,990	8,390	4,510	19,500

	District 4		Districts 5 and 6	
	Quantity	Value	Quantity	Value
Concrete aggregate (including concrete sand)	906	3,790	634	3,340
Concrete products (blocks, bricks, pipe, decorative, etc.) 2/	W	W	W	W
Asphaltic concrete aggregates and other bituminous mixtures	--	--	23	152
Road base and coverings 3/	W	W	W	W
Fill	87	302	206	597
Snow and ice control	W	W	--	--
Other miscellaneous uses 4	31	170	94	306
Unspecified: 5/				
Reported	156	642	291	1,410
Estimated	170	680	270	1,200
Total	1,350	5,590	1,520	7,030

W Withheld to avoid disclosing company proprietary data; included with "Other miscellaneous uses." -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

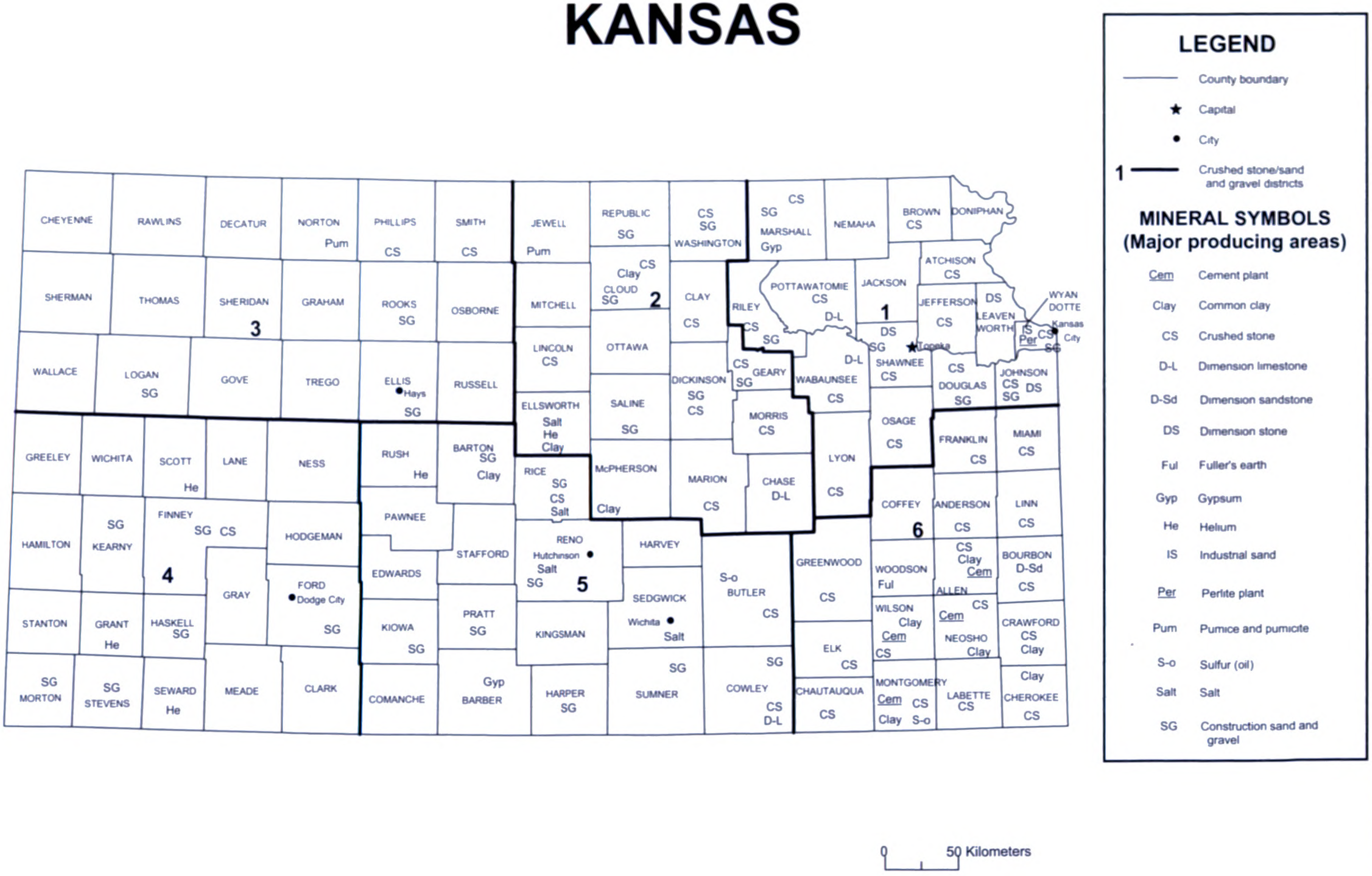
2/ Includes plaster and gunite sands.

3/ Includes road and other stabilization (cement and lime).

4/ Includes roofing granules.

5/ Reported and estimated production without a breakdown by end use.

KANSAS



Source: Kansas Geological Survey/U.S. Geological Survey (2001)

THE MINERAL INDUSTRY OF KANSAS

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Kansas Geological Survey for collecting information on all nonfuel minerals.

In 2001, the estimated value[1] of nonfuel mineral production for Kansas was $640 million, based upon preliminary U.S. Geological Survey (USGS) data. This was about a 2% increase from that of 2000[2] and followed a 4.7% increase from 1999 to 2000. The State remained 23d in rank among the 50 States in total nonfuel mineral production value, of which Kansas accounted for about 1.5% of the U.S. total.

Grade-A helium, portland cement, salt, and crushed stone were Kansas' leading nonfuel mineral commodities in 2001, accounting for about 26%, 23%, 19%, and 17%, respectively, of the State's total nonfuel mineral production value. In 2001, the largest increases in production and value, being those of Grade-A helium, salt, and crude helium (descending order of change), were greater than the most significant decreases that occurred in portland cement and crushed stone, resulting in the State's rise in value (table 1). In 2000, the most significant increases were those in Grade-A helium (up $32 million), portland cement (up $6 million), and gypsum (up $3 million). The most significant decreases were those of crude helium (down about $5 million) and construction sand and gravel and crushed stone (down about $3 million each).

Based upon USGS estimates of the quantities produced in 2001 in the 50 States, Kansas continued as the Nation's leading producer of crude and Grade-A helium and remained fifth in salt, sixth of six States that produce pumice and pumicite, and ninth in gypsum and fuller's earth. Additionally, significant quantities of portland cement, crushed stone, construction sand and gravel, common clays, and dimension stone (descending order of value) were produced in the State. Production of nonfuel minerals in Kansas has consisted entirely of industrial minerals since 1970, following nearly a century (since 1877) of metallic mineral mining in the State. The last zinc and lead mining operation closed down in 1970 owing in part to low zinc prices, low-grade ore, and the high operating costs of required pollution control systems.

The following narrative information was provided by the Kansas Geological Survey[3] (KGS). According to the Labor Market Information Services of the Kansas Department of Human Resources, an average of nearly 6,900 persons were employed in all aspects of mining during 2001. The majority were employed in the oil and gas extraction segment of mining, with the remainder in coal and nonmetallic, nonfuel mining operations. The nonfuel industrial mineral operations averaged 1,300 persons with an average salary of $39,740 per year. These figures are derived from the North American Industrial Classification System (NAICS), which Kansas intends to use in the future.

Mergers and acquisitions to create more efficient operations continued. The quarries of long-time aggregate producer Walker Stone Co. were acquired by Martin Marietta Corp. Walker Stone had quarries in Geary, Dickinson, Butler, and Greenwood Counties. Brick producer Cloud Ceramics (Cloud County) acquired the operations of Kansas Brick and Tile (Barton County).

In 2001, the State concluded two contentious issues from the past several years. In the eastern part of the State, four counties that have their own rock-crushing facilities to produce aggregate for county roads also had been selling their excess capacity on the open market and thereby allegedly competing directly with private industry. Expansion of public ownership was opposed by the Kansas Aggregate Producers Association-Kansas Ready Mix Concrete Association (KAPA-KRMCA). The KAPA-KRMCA sponsored legislation that was passed by the State legislature during 2001 that banned the sale of paving materials by county operations to the public.

Another issue continuing from 2000 involved counties' rights to impose severance taxes on mineral producers. Previously, this was thought to be resolved with the passage of House bill 2584 in 1998, which prohibited counties from imposing severance taxes on mineral extraction. However, in 2000, Dickinson County continued to pursue the severance tax on the grounds that the legislature's actions should not affect taxes established prior to the passage of legislation. However, apparently the prospect of a lengthy court battle settled the issue (at least for the time being) as no further action was taken by the county during 2001.

In 1999, a 10-year Comprehensive Transportation Program (CTP) was approved for Kansas. By early 2000, it became apparent that State revenues were declining and that program cuts were likely. The Governor recommended cuts of $27 million for fiscal year (FY) 2000 and $40 million for FY 2001. The total for the 2 years, $67 million, was nearly as much as the $72 million that was to be raised by the new fuel tax passed to raise revenue for the CTP. During FY 2002, State revenues continued to decline, and the CTP took another cut of $90 million. The Kansas Department of Transportation (KDOT) officials think the cuts will not disrupt the program, although another fuel tax increase may be required as a means to provide additional funding.

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[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2001 USGS mineral production data published in this chapter are preliminary estimates as of August 2002 and are expected to change. For some mineral commodities, such as construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Specialist contact information may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals/contacts/comdir.html; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2] Values, percentage calculations, and rankings for 2000 may differ from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also change.

[3] David A. Grisafe, an Associate Scientist with the Kansas Geological Survey, authored the text of the State mineral industry information provided by that agency.

Government Programs

The multiyear State mapping program at the KGS continued. Geologic maps were issued for Shawnee (M-95) and Anderson (M-100) Counties. A geologic map (M-99) was also issued for the Tallgrass Prairie National Preserve. Map preparations and field mapping are ongoing for Kearney, Hamilton, Bourbon, Comanche, Neosho, Cherokee, Ford, Republic, Douglas, Hodgeman, Gray, Barber, Crawford, Washington, Marshall, Osborne, and Sedgwick Counties. Digital updates are underway for Pottawatomie County and are essentially complete for Johnson and Osage Counties.

A total of more than 70 open-file reports (OFR) were filed with the library of the KGS. These reports cover a variety of project results, primarily by KGS staff. Many of the year's reports include geologic maps. For example, OFR 2001-12 contains field geology maps for additional portions of Crawford County; 2001-15 contains preliminary geology field maps for portions of Hodgeman County; 2001-24 through 2001-31 include geologic maps of the Cottonwood Falls, Homestead, Matfield Green, Gladstone, Staffordville, Thrall NW, Hymer, and Elmdale quadrangles in Chase County; 2001-53 and 2001-54 are geologic maps of the Osage City and Osage City SE, respectively, in Osage County; and 2001-64 contains preliminary geologic maps of Pottawatomie County.

Among other open-file reports of interest are OFR 2001-21, a stratigraphic bibliography through 2000, arranged by geologic period; OFR 2001-37, a summary of the STATEMAP component of the USGS National Cooperative Geologic Mapping Program in the United States in 2001; and OFR 2001-74, case history of the collapse, eruption, and emergency backfilling and grouting of the abandoned Crystal Salt Mine shaft, Ellsworth County, Kansas. This collapse is the October 2000 event described in a previous report (U.S. Geological Survey, 2002). All publications, maps, and open-file reports are available on the Internet at URL http://www.kgs.ukans.edu/.

Reference Cited

U.S. Geological Survey, 2002, The mineral industry of Kansas, *in* Area reports—Domestic: U.S. Geological Survey Minerals Yearbook 2000, v. II, p. 18.1-18.5.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN KANSAS 1/ 2/

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral	1999 Quantity	1999 Value	2000 Quantity	2000 Value	2001 p/ Quantity	2001 p/ Value
Cement, portland	1,970	149,000 e/	1,980	155,000 e/	1,840 e/	144,000 e/
Clays, common	592	2,770	594	3,970	594	3,970
Gemstones	NA	21	NA	12	NA	3
Helium:						
Crude million cubic meters	W	W	W	W	45	48,700
Grade-A do.	61	121,000	77	153,000	85	169,000
Salt	2,780	115,000	2,770	114,000	3,120	121,000
Sand and gravel, construction	10,800	31,300	10,000	28,200	10,200	29,100
Stone:						
Crushed	23,700	116,000	23,300	113,000	21,400	107,000
Dimension metric tons	16,100	1,640	14,100	1,890	14,000	1,800
Combined values of cement (masonry), clays (fuller's earth), gypsum (crude), helium (crude), pumice and pumicite, sand and gravel (industrial)	XX	63,700	XX	59,800	XX	15,900
Total	XX	601,000 r/	XX	629,000	XX	640,000

e/ Estimated. p/ Preliminary. r/ Revised. NA Not available. W Withheld to avoid disclosing company proprietary data. XX Not applicable.
1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).
2/ Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 2
KANSAS: CRUSHED STONE SOLD OR USED, BY KIND 1/

	1999				2000			
Kind	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone 2/	120	W	W	W	111	W	W	W
Sandstone and quartzite	3	W	W	W	3	W	W	W
Total or average	XX	23,700 r/	$116,000	$4.92	XX	23,300	$113,000	$4.85

r/ Revised. W Withheld to avoid disclosing company proprietary data; included in "Total." XX Not applicable.
1/ Data are rounded to no more than three significant digits; may not add to totals shown.
2/ Includes limestone-dolomite reported with no distinction between the two.

TABLE 3
KANSAS: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+1 1/2 inch):			
Macadam	2	$7	$3.50
Riprap and jetty stone	130	1,390	10.71
Filter stone	154	1,160	7.51
Other coarse aggregate	166	893	5.38
Total or average	452	3,450	7.63
Coarse aggregate, graded:			
Concrete aggregate, coarse	370	2,730	7.38
Bituminous aggregate, coarse	270	1,390	5.16
Bituminous surface-treatment aggregate	W	W	6.00
Railroad ballast	5	22	4.40
Other graded coarse aggregate	1,560	7,600	4.86
Total or average	2,210	11,700	5.32
Fine aggregate (-3/8 inch):			
Stone sand, bituminous mix or seal	W	W	6.08
Screening, undesignated	645	2,550	3.96
Other fine aggregate	731	2,840	3.89
Total or average	1,380	5,400	3.92
Coarse and fine aggregate:			
Graded road base or subbase	466	2,290	4.92
Unpaved road surfacing	748	3,300	4.41
Crusher run or fill or waste	70	360	5.14
Roofing granules	W	W	6.78
Other coarse and fine aggregates	708	3,470	4.91
Total or average	1,990	9,430	4.73
Other construction materials	452	2,640	5.85
Agricultural limestone	101	500	4.95
Chemical and metallurgical:			
Cement manufacture	2,790	11,400	4.08
Lime manufacture	3	18	6.00
Unspecified: 3/			
Reported	10,800	53,400	4.94
Estimated	3,000	15,000	4.85
Total or average	13,900	68,300	4.92
Grand total or average	23,300	113,000	4.85

W Withheld to avoid disclosing company proprietary data; included with "Other."

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Includes limestone, limestone-dolomite, and sandstone and quartzite.

3/ Reported and estimated production without a breakdown by end use.

TABLE 4
KANSAS: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE AND DISTRICT 1/ 2/

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3		District 5		District 6	
Use	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Construction:										
Coarse aggregate (+1 1/2 inch) 3/	237	1,750	116	967	--	--	W	W	W	W
Coarse aggregate, graded 4/	1,530	7,550	W	W	--	--	W	W	W	W
Fine aggregate (-3/8 inch) 5/	814	3,140	W	W	--	--	W	W	W	W
Coarse and fine aggregate 6/	839	3,950	W	W	W	W	W	W	510	2,060
Other construction materials	19	74	--	--	--	--	--	--	433	2,570
Agricultural 7/	47	208	W	W	--	--	W	W	W	W
Chemical and metallurgical 8/	--	--	--	--	--	--	--	--	2,790	11,400
Unspecified: 9/										
Reported	5,520	27,700	590	2,860	--	--	767	3,580	3,950	19,300
Estimated	140	690	W	W	W	W	340	1,700	2,100	10,000
Total	9,140	45,100	2,230	12,400	216	891	1,540	7,520	10,100	46,900

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ No crushed stone reported for District 4.

3/ Includes filter stone, macadam, riprap and jetty stone, and other coarse aggregate.

4/ Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), railroad ballast, and other graded coarse aggregate.

5/ Includes screening (undesignated), stone sand (bituminous mix or seal), and other fine aggregate.

6/ Includes crusher run (select material or fill), graded road base or subbase, roofing granules, unpaved road surfacing, and other coarse and fine aggregates.

7/ Includes agricultural limestone.

8/ Includes cement manufacture and lime manufacture.

9/ Reported and estimated production without a breakdown by end use.

TABLE 5
KANSAS: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	2,480	$7,010	$2.82
Plaster and gunite sands	98	265	2.70
Concrete products (blocks, bricks, pipe, decorative, etc.)	30	335	11.17
Asphaltic concrete aggregates and other bituminous mixtures	1,450	5,060	3.48
Road base and coverings 2/	2,200	5,570	2.53
Fill	992	1,980	1.99
Snow and ice control	41	145	3.54
Other miscellaneous uses 3/	74	394	5.32
Unspecified: 4/			
Reported	473	1,180	2.48
Estimated	2,200	6,300	2.87
Total or average	10,000	28,200	2.81

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Includes road and other stabilization (cement).

3/ Includes filtration.

4/ Reported and estimated production without a breakdown by end use.

TABLE 6
KANSAS: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY USE AND DISTRICT 1/ 2/

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate (including concrete sand)	846	2,440	274	1,190	98	309
Concrete products (blocks, bricks, pipe, decorative, etc.) 3/	W	W	W	W	3	12
Asphaltic concrete aggregates and other bituminous mixtures	W	W	W	W	103	309
Road base and coverings 4/	W	W	W	W	419	729
Fill	110	292	260	609	29	87
Snow and ice control	W	W	W	W	5	14
Other miscellaneous uses 5/	240	911	414	1,650	--	--
Unspecified: 6/						
Reported	190	660	--	--	25	75
Estimated	843	2,500	210	580	--	--
Total	2,230	6,850	1,160	4,030	683	1,540

	District 4		District 5	
	Quantity	Value	Quantity	Value
Concrete aggregate (including concrete sand)	176	469	1,090	2,600
Concrete products (blocks, bricks, pipe, decorative, etc.) 3/	20	56	86	423
Asphaltic concrete aggregates and other bituminous mixtures	154	1,030	894	2,580
Road base and coverings 4/	831	1,930	670	1,910
Fill	45	147	548	840
Snow and ice control	9	25	10	34
Other miscellaneous uses 5/	32	87	4	53
Unspecified: 6/				
Reported	223	369	36	71
Estimated	430	1,200	720	2,000
Total	1,920	5,340	4,050	10,500

W Withheld to avoid disclosing company proprietary data; included with "Other miscellaneous uses." -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ No production reported in District 6.

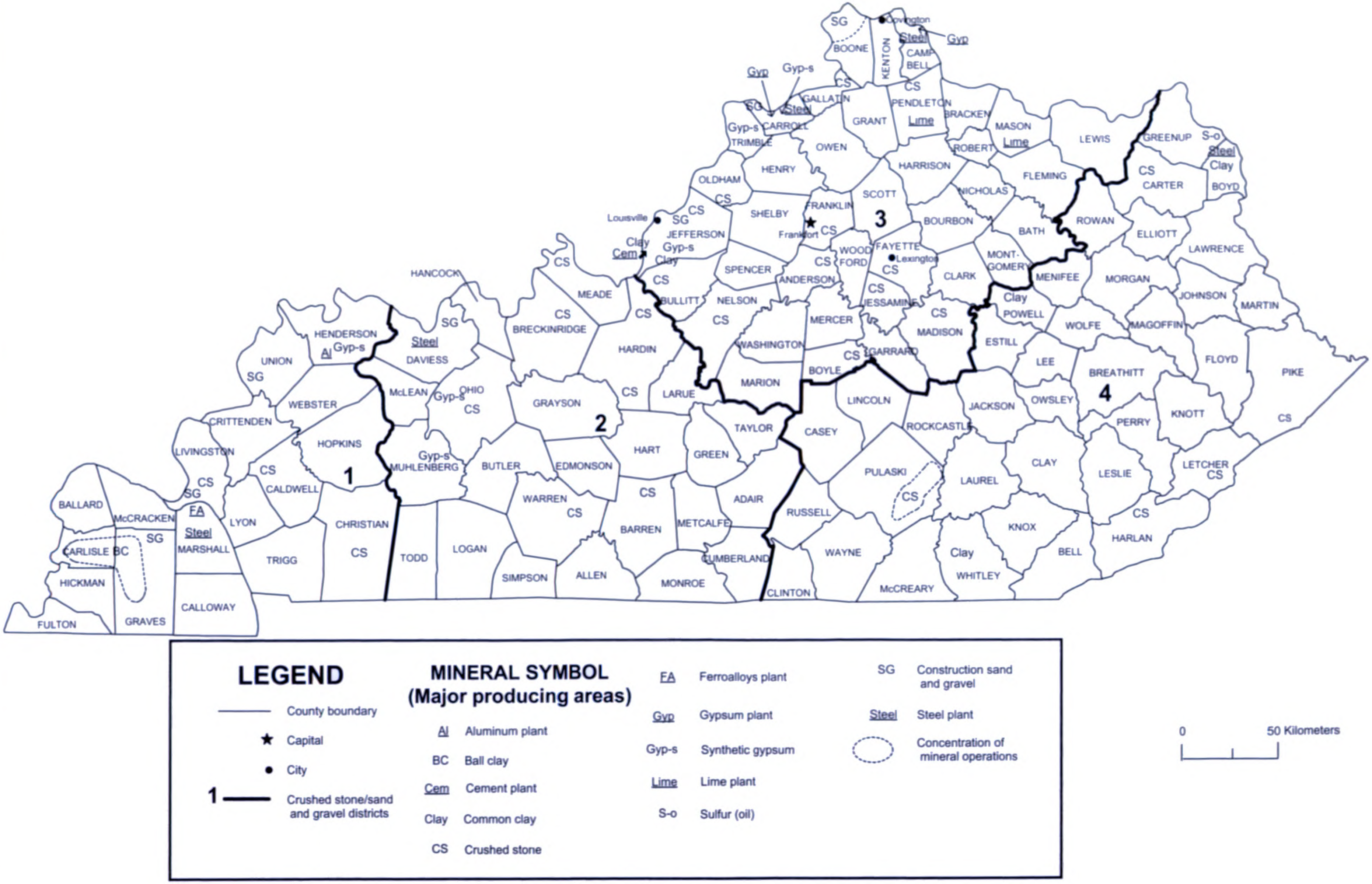
3/ Includes plaster and gunite sands.

4/ Includes road and other stabilization (cement).

5/ Includes filtration and snow and ice control.

6/ Reported and estimated production without a breakdown by end use.

KENTUCKY



Source: Kentucky Geological Survey/U.S. Geological Survey (2001)

THE MINERAL INDUSTRY OF KENTUCKY

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Kentucky Geological Survey for collecting information on all nonfuel minerals.

In 2001, the estimated value[1] of nonfuel mineral production for Kentucky was $531 million, based upon preliminary U.S. Geological Survey (USGS) data. This was about a 6% increase from that of 2000[2] and followed a marginal decrease in 2000 from 1999. The State rose to 26th from 29th in rank among the 50 States in total nonfuel mineral production value, of which Kentucky accounted for about 1.5% of the U.S. total.

Crushed stone continued as Kentucky's leading nonfuel mineral commodity in 2001 and accounted for nearly 60% of the State's raw nonfuel mineral production value. Lime was second, and portland cement was third.

In 2001, a very substantial increase in the production and value of portland cement along with a significant increase in crushed stone (table 1) accounted for nearly all the State's increase in mineral value. The value of gemstones was also up slightly. Decreases in construction sand and gravel, lime, and ball clay production values (descending order of change) somewhat moderated the increase for the year (table 1).

In 2000, decreases in the values of crushed stone, down $12 million, and portland cement, down more than $8 million, offset the increased values of lime and ball clay, which were up a combined $16 million, and construction sand and gravel, up almost $4 million, resulting in the small net decrease for the year. Small decreases also occurred in gemstones and masonry cement.

Compared with USGS estimates of the quantities produced in the other 49 States during 2001, Kentucky remained third of four ball-clay-producing States and eighth in common clay, and it dropped to fourth from second in lime. Additionally, the State produced significant quantities of crushed stone and portland cement. Primary aluminum and raw steel were produced from materials obtained from other domestic and foreign sources. Based upon USGS annual data, Kentucky became the Nation's leading producer of primary aluminum (second in 2000).

The following narrative information was provided by the Kentucky Geological Survey[3] (KGS). On September 21, 2001, the Governor of Kentucky issued an executive order that established a moratorium on the issuance of new permits for noncoal mineral operations in the Commonwealth and that directed a review of permits and laws regarding oil and gas wells in the Pine Mountain area of southeastern Kentucky. Suspension of the issuance of new permits extends through July 15, 2002. The executive order, among other things, directed the Cabinet for Natural Resources and Environmental Protection to review all current laws and regulations related to reclamation of noncoal mining and excavation activity. It also directed the Transportation Cabinet to study any increase in the cost of highway construction materials that may result from proposed reclamation requirements (Patton, 2001).

A new quarry was opened in the Louisville metropolitan area. The operation of Brooks Crushed Stone, LLC was in northern Bullitt County. Burton Stone, Inc. also opened a quarry in Adair County of south-central Kentucky (Kentucky Crushed Stone Association, 2001).

The Kentucky Economic Development Finance Authority approved a $240,000 loan for a new limestone processor in Breckinridge County. Bedrock Products, LLC planned to hire 24 workers to crush and process limestone that will be stained in several colors and coated with acrylic polymer. The product will be marketed for home and commercial landscaping (Jordan, 2001).

Imerys USA, Inc. purchased the Kentucky-Tennessee Clay Co. from Hecla Mining Co. The purchase included ball clay operations in western Kentucky (Industrial Minerals, 2001).

In March, the NS Group, Inc. announced a cutback in steelmaking operations at Kentucky and Pennsylvania plants. It will stop manufacturing steel and hot-rolled coils at its Newport Steel facility in Wilder, KY, eliminatiing 300 jobs (Associated Press, 2001). In May, the Southwire Co. announced that it will reduce the workforce at its Hawesville aluminum plant by 27 jobs (Courier-Journal, 2001).

References Cited

Associated Press, 2001, NS Group to lay off 300 workers in Kentucky: Lexington (KY) Herald-Leader, March 30, p. B5-B6.

Courier-Journal, 2001, Southwire plant to cut 27 jobs: Courier-Journal (Louisville), May 9, p. D1.

Industrial Minerals, 2001, Imerys to rescue Hecla with $62.5m. K-T Clay buy: Industrial Minerals, no. 403, April, p. 8.

Jordan, Jim, 2001, State panel oks loan for limestone processor: Lexington (KY) Herald-Leader, January 26, p. B10.

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[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2001 USGS mineral production data published in this chapter are preliminary estimates as of August 2002 and are expected to change. For some mineral commodities, such as construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Specialist contact information may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals/contacts/comdir.html; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2] Values, percentage calculations, and rankings for 2000 may differ from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also change.

[3] Garland R. Dever, Jr., Geologist, submitted the text of the State mineral industry information provided by the Kentucky Geological Survey.

Kentucky Crushed Stone Association, 2001, Member news: KCSA Newsletter, August, p. 3.

Patton, P.E., 2001, Relating to the establishment of a moratorium on permits for non-coal mineral operations and the review of permits and laws regarding oil and gas wells in the Pine Mountain area: Frankfort, KY, Secretary of State Executive Order 2001-1194, 2 p.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN KENTUCKY 1/ 2/

(Thousand metric tons and thousand dollars)

	1999		2000		2001 p/	
Mineral	Quantity	Value	Quantity	Value	Quantity	Value
Clays:						
Common	892	3,790	1,000	4,190	1,000	4,190
Fire	W	W	10	35	9	35
Gemstones	NA	292	NA	47	NA	64
Sand and gravel, construction	9,620	32,400	11,000	36,000	8,500	28,300
Stone, crushed 3/	59,800 r/	308,000 r/	55,600	296,000	57,600	316,000
Combined values of cement, clays (ball), lime	XX	158,000	XX	164,000	XX	183,000
Total	XX	502,000	XX	501,000	XX	531,000

p/ Preliminary. r/ Revised. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined values" data. XX Not applicable.

1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/ Data are rounded to no more than three significant digits; may not add to totals shown.

3/ Excludes certain stones; kind and value included with "Combined values" data.

TABLE 2
KENTUCKY: CRUSHED STONE SOLD OR USED BY PRODUCERS, BY KIND 1/

	1999				2000			
Kind	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone	98	W	W	W	95	W	W	W
Sandstone	1	W	W	W	1	W	W	W
Total or average	XX	59,800 r/	$308,000 r/	$5.14 r/	XX	55,600	$296,000	$5.33

r/ Revised. W Withheld to avoid disclosing company proprietary data; included in "Total." XX Not applicable.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 3
KENTUCKY: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+1 1/2 inch):			
Macadam	W	W	$3.00
Riprap and jetty stone	435	$2,700	6.21
Filter stone	411	2,430	5.91
Other coarse aggregate	1,670	8,400	5.04
Total or average	2,510	13,500	5.38
Coarse aggregate, graded:			
Concrete aggregate, coarse	2,330	13,200	5.69
Bituminous aggregate, coarse	3,240	20,500	6.33
Bituminous surface-treatment aggregate	449	2,890	6.43
Railroad ballast	76	359	4.72
Other graded coarse aggregate	5,940	30,900	5.19
Total or average	12,000	67,800	5.64
Fine aggregate (-3/8 inch):			
Stone sand, concrete	274	1,290	4.72
Stone sand, bituminous mix or seal	943	5,400	5.73
Screening, undesignated	605	2,890	4.78
Other fine aggregate	1,960	9,850	5.03
Total or average	3,780	19,400	5.14
Coarse and fine aggregate:			
Graded road base or subbase	3,600	19,500	5.42
Unpaved road surfacing	2,330	10,200	4.37
Terrazzo and exposed aggregate	W	W	4.86
Crusher run or fill or waste	440	1,830	4.16
Other coarse and fine aggregates	3,450	16,600	4.82
Total or average	9,820	48,100	4.90
Other construction materials	(3/)	(3/)	3.86
Agricultural limestone	(3/)	(3/)	4.29
Chemical and metallurgical:			
Cement manufacture	(3/)	(3/)	3.49
Lime manufacture	3,960	34,500	8.71
Flux stone	628	2,520	4.01
Special, mine dusting or acid water treatment	(3/)	(3/)	26.74
Other miscellaneous uses, pipe bedding	(3/)	(3/)	5.00
Unspecified: 4/			
Reported	12,600	61,400	4.88
Estimated	7,700	38,000	4.96
Total or average	20,300	99,700	4.91
Grand total or average	55,600	296,000	5.33

W Withheld to avoid disclosing company proprietary data; included with "Other."

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Includes dolomite and limestone.

3/ Withheld to avoid disclosing company proprietary data, included in "Grand total or average."

4/ Reported and estimated production without a breakdown by end use.

TABLE 4
KENTUCKY: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3		District 4	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Construction:								
Coarse aggregate (+1 1/2 inch) 2/	W	W	W	W	466	2,940	905	4,730
Coarse aggregate, graded 3/	W	W	W	W	3,490	22,800	3,990	19,400
Fine aggregate (-3/8 inch) 4/	W	W	W	W	1,200	5,870	1,130	5,700
Coarse and fine aggregate 5/	W	W	W	W	4,960	25,300	1,650	7,600
Other construction materials	--	--	--	--	W	W	W	W
Agricultural 6/	W	W	401	1,490	234	1,250	W	W
Chemical and metallurgical 7/	--	--	W	W	W	W	--	--
Special 8/	--	--	--	--	W	W	--	--
Other miscellaneous uses 9/	--	--	--	--	--	--	W	W
Unspecified: 10/								
Reported	8,060	39,300	45	186	3,850	19,000	635	2,980
Estimated	400	2,000	2,900	14,000	2,000	9,900	2,400	12,000
Total	13,600	70,600	9,940	46,000	21,200	127,000	10,800	52,700

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes filter stone, macadam, riprap and jetty stone, and other coarse aggregate.

3/ Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), railroad ballast, and other graded coarse aggregate.

4/ Includes screening (undesignated), stone sand (bituminous mix or seal), stone sand (concrete), and other fine aggregate.

5/ Includes crusher run (select material or fill), graded road base or subbase, terrazzo and exposed aggregate, unpaved road surfacing, and other coarse and fine aggregates.

6/ Includes agricultural limestone.

7/ Includes cement manufacture, flux stone, and lime manufacture.

8/ Includes mine dusting or acid water treatment.

9/ Includes pipe bedding.

10/ Reported and estimated production without a breakdown by end use.

TABLE 5
KENTUCKY: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate and concrete products	1,760	$6,220	$3.54
Asphaltic concrete aggregates and road base materials	176	880	5.00
Fill 2/	209	673	3.22
Other miscellaneous uses	7	104	14.86
Unspecified: 3/			
Reported	1,220	3,330	2.73
Estimated	7,600	25,000	3.26
Total or average	11,000	36,000	3.28

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Includes snow and ice control.

3/ Reported and estimated production without a breakdown by end use.

TABLE 6
KENTUCKY: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY USE AND DISTRICT 1/ 2/

(Thousand metric tons and thousand dollars)

	Districts 1 and 2		Districts 3 and 4	
Use	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products	W	W	W	W
Asphaltic concrete aggregates and road base materials	W	W	W	W
Other miscellaneous uses 2/	1,290	4,100	2,080	7,110
Unspecified: 3/				
Reported	W	W	W	W
Estimated	4,400	14,000	3,200	11,000
Total	5,690	17,800	5,300	18,300

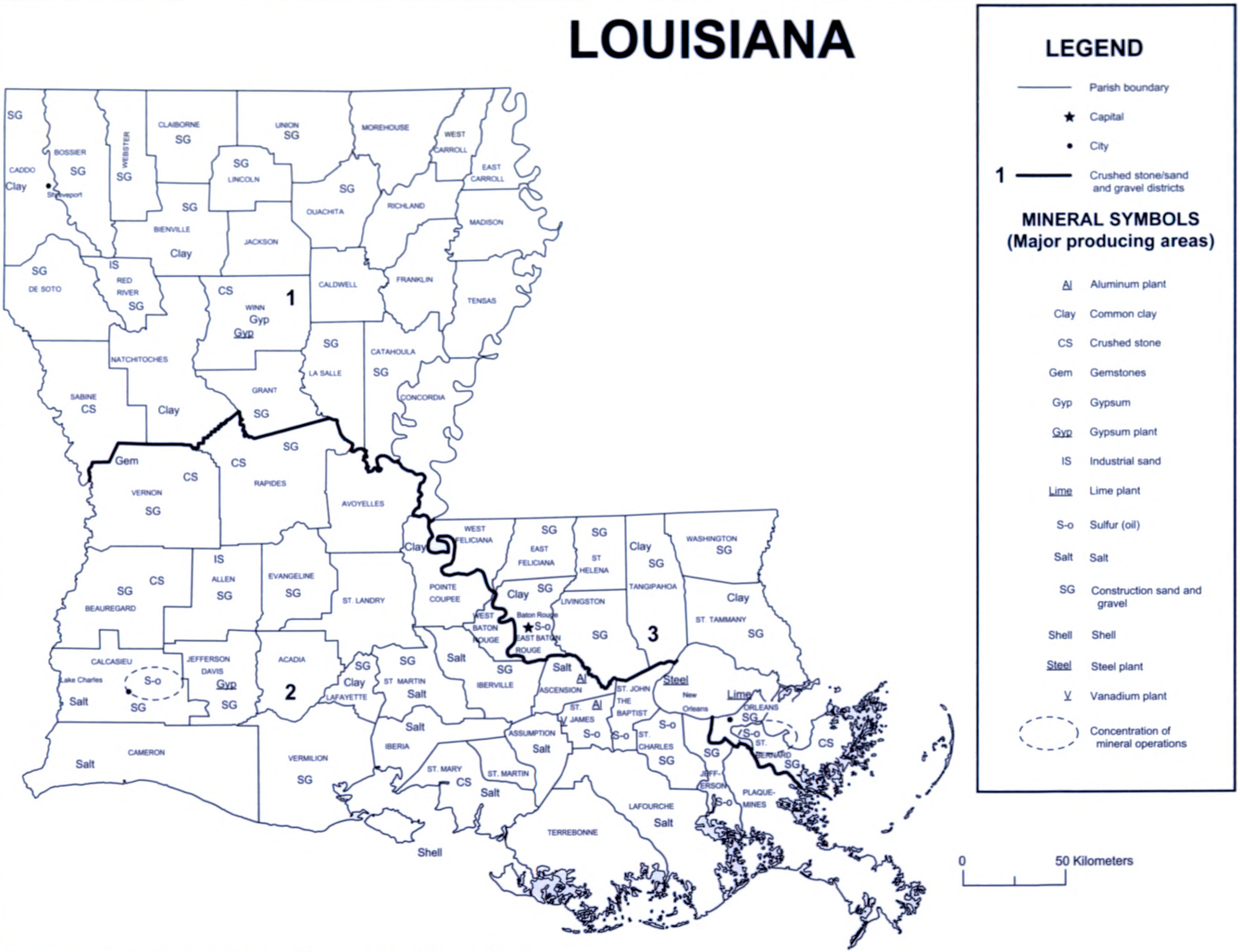
W Withheld to avoid disclosing company proprietary data; included with "Other miscellaneous uses."

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes fill and snow and ice control.

3/ Reported and estimated production without a breakdown by end use.

LOUISIANA



Source: Louisiana Geological Survey/U.S. Geological Survey (2001)

THE MINERAL INDUSTRY OF LOUISIANA

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Louisiana Geological Survey for collecting information on all nonfuel minerals.

In 2001, the estimated value[1] of nonfuel mineral production for Louisiana was $274 million, based upon preliminary U.S. Geological Survey (USGS) data. This was a 16% decrease from that of 2000[2] and followed a 19% decrease from 1999 to 2000. The State ranked 37th (35th in 2000) among the 50 States in total nonfuel mineral production value, of which Louisiana accounted for about 1% of the U.S. total.

Louisiana's leading nonfuel mineral is salt, accounting for about half of the State's nonfuel mineral value in 2001. In 2001, substantial drops in the production and value of sulfur and, to a lesser and yet significant extent, lime (down about $4 million) were greater than the increases that occurred in salt (up about $18 million), crushed stone, and construction sand and gravel, resulting in the State's overall decrease in nonfuel mineral value for the year. Prior to 2001, sulfur production was included as part of Louisiana's mineral production and was for many years the State's second leading nonfuel mineral commodity. All recent sulfur production came from a mine that was 28 kilometers offshore, owned and operated by Freeport-McMoRan Sulphur Inc., based in New Orleans. Owing to the mine's location, the State of Louisiana received no severance tax income or mineral production royalties; these were collected by the Federal Government. Consequently, since 1991, the State and the Louisiana Geological Survey have not considered the sulfur production as cited in table 1 under "Combined values" as being part of Louisiana's nonfuel mineral production. The USGS attributed this offshore sulfur production to Louisiana because it was the State nearest to the sulfur mine. This mine closed in August 2000 and hence accounted for a significant portion of the State's drop in nonfuel mineral value in 2000 and 2001.

In 2000, a $69 million drop in the value of salt plus significant decreases in sulfur and construction sand and gravel accounted for nearly all of the State's decrease for the year. Increases occurred in crushed stone (limestone and sandstone), industrial sand and gravel, lime, and gypsum (descending order of change) (table 1).

Based upon USGS estimates of the quantities produced in the 50 States during 2001, Louisiana remained the leading State in the Nation in the production of salt. Additionally, the State was a significant producer of common clays, construction sand and gravel, and industrial sand and gravel.

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[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2001 USGS mineral production data published in this chapter are preliminary estimates as of August 2002 and are expected to change. For some mineral commodities, such as construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Specialist contact information may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals/contacts/comdir.html; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2] Values, percentage calculations, and rankings for 2000 may differ from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also change.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN LOUISIANA 1/ 2/

(Thousand metric tons and thousand dollars)

Mineral	1999 Quantity	1999 Value	2000 Quantity	2000 Value	2001 p/ Quantity	2001 p/ Value
Clays, common	626	1,540	636	1,530	636	1,540
Gemstones	NA	7	NA	6	NA	6
Salt	16,500	193,000	13,400	124,000	14,500	142,000
Sand and gravel:						
Construction	16,500	81,700	14,900	76,900	17,400	91,300
Industrial	636	10,400	648	12,300	648	12,300
Combined values of gypsum (crude), lime, stone (crushed limestone and sandstone), sulfur [Frasch (1999-2000)]	XX	116,000 r/	XX	110,000	XX	27,400
Total	XX	402,000 r/	XX	325,000	XX	274,000

p/ Preliminary. r Revised. NA Not available. XX Not applicable.

1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/ Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 2
LOUISIANA: CRUSHED STONE SOLD OR USED, BY KIND

Kind	1999 Number of quarries	1999 Quantity (thousand metric tons)	1999 Value (thousands)	1999 Unit value	2000 Number of quarries	2000 Quantity (thousand metric tons)	2000 Value (thousands)	2000 Unit value
Limestone	(1/) r/	W	W	W	(1/)	W	W	W
Sandstone	2 r/	W	W	W	1	W	W	W
Total or average	XX	W	W	W	XX	W	W	W

r/ Revised. W Withheld to avoid disclosing company proprietary data. XX Not applicable.

1/ Sales/distribution yards.

TABLE 3
LOUISIANA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate, graded, bituminous aggregate, coarse	W	W	W
Fine aggregate (-3/8 inch), stone sand, concrete	W	W	W
Total or average	W	W	W

W Withheld from total to avoid disclosing company proprietary data.

TABLE 4
LOUISIANA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate and concrete products	5,060	$25,000	$4.95
Asphaltic concrete aggregates and other bituminous mixtures	394	1,090	2.77
Road base and coverings	831	8,440	10.15
Fill	370	1,250	3.38
Other miscellaneous uses 2/	181	2,860	15.81
Unspecified: 3/			
Reported	3,840	17,500	4.57
Estimated	4,200	21,000	4.91
Total or average	14,900	76,900	5.17

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Includes railroad ballast.

3/ Reported and estimated production without a breakdown by end use.

TABLE 5
LOUISIANA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products	W	W	W	W	4,470	21,900
Asphaltic concrete aggregates and road base materials	--	--	904	7,060	320	2,470
Fill	9	28	303	1,090	58	130
Other miscellaneous uses 2/	583	3,320	1,380	7,800	166	2,640
Unspecified: 3/						
Reported	W	W	W	W	2,480	9,790
Estimated	420	2,900	760	1,100	3,000	15,000
Total	1,010	6,290	3,350	19,000	10,500	51,600

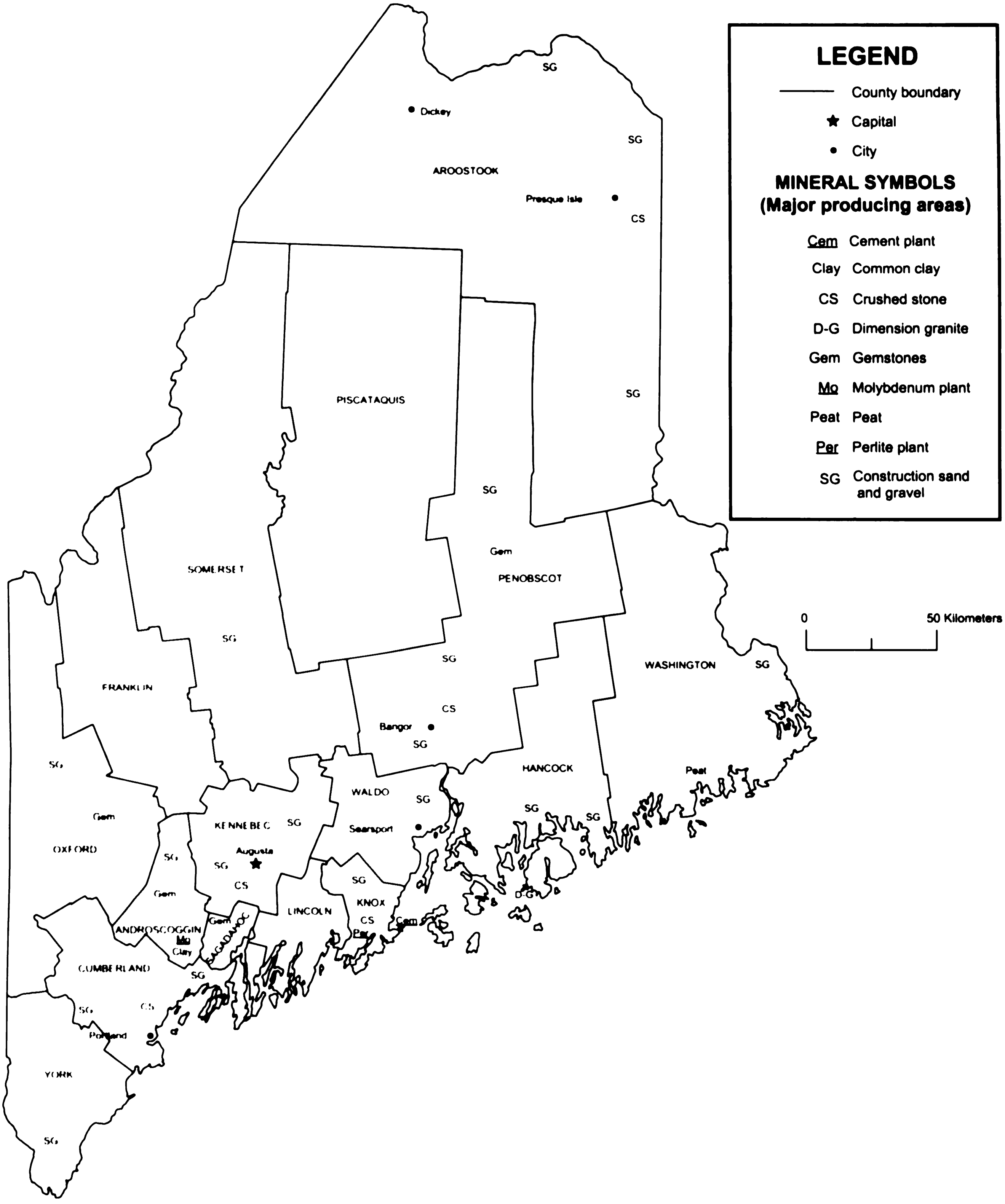
W Withheld to avoid disclosing company proprietary data; included with "Other miscellaneous materials." -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes railroad ballast.

3/ Reported and estimated production without a breakdown by end use.

MAINE



Source: Maine Geological Survey/U.S. Geological Survey (2001)

THE MINERAL INDUSTRY OF MAINE

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Maine Geological Survey for collecting information on all nonfuel minerals.

In 2001, the estimated value[1] of nonfuel mineral production for Maine was $91 million, based upon preliminary U.S. Geological Survey (USGS) data. This was a less than 5% decrease from that of 2000[2] and followed a 4.5% decrease in 2000 from that of 1999.

The large majority of Maine's nonfuel mineral production resulted from the mining and production of construction minerals and materials—construction sand and gravel, cement (portland and masonry), crushed stone, and dimension granite (descending order of value). In 2001, construction sand and gravel and crushed stone alone accounted for more than 64% of the State's total nonfuel mineral value. The majority of the decrease in value resulted from a drop in the production and value of portland cement. Further information regarding cement and dimension granite have been withheld to protect company proprietary data. In 2000, the State's drop in value was mostly the result of decreases in the production and value of construction sand and gravel (down about $2.7 million) plus smaller decreases in the same of portland cement. All other changes in both years were small and inconsequential to the net result (table 1).

Based upon USGS estimates of the quantities of minerals produced in the United States in 2001, Maine (by value) remained 13th in the production of gemstones and increased in rank to 6th from 7th in the production of peat.

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[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2001 USGS mineral production data published in this chapter are preliminary estimates as of August 2002 and are expected to change. For some mineral commodities, such as construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Specialist contact information may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals/contacts/comdir.html; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2] Values, percentage calculations, and rankings for 2000 may differ from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also change.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN MAINE 1/ 2/

(Thousand metric tons and thousand dollars)

	1999		2000		2001 p/	
Mineral	Quantity	Value	Quantity	Value	Quantity	Value
Clays, common	W	W	49 e/	125 e/	49	125
Gemstones	NA	229	NA	239	NA	238
Sand and gravel, construction	8,570	40,300	9,670	37,600	9,600	37,900
Stone, crushed	3,550 r/	21,200 r/	3,650	21,100	3,400	20,200
Combined values of cement, peat, stone (dimension granite), and values indicated by symbol W	XX	38,400	XX	36,500	XX	32,500
Total	XX	100,000	XX	95,500	XX	91,000

e/ Estimated. p/ Preliminary. r/ Revised. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined values" data. XX Not applicable.

1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/ Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 2
MAINE: CRUSHED STONE SOLD OR USED, BY KIND 1/

	1999				2000			
Kind	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone	5	1,300	$7,640	$5.86	5	1,300	$7,260	$5.58
Granite	4 r/	1,140	7,280	6.41 r/	4	1,320	7,150	5.49
Traprock	1 r/	W	W	6.78 r/	1	W	W	8.89
Quartzite	3 r/	W	W	6.61 r/	2	W	W	6.16
Slate	1 r/	W	W	5.72 r/	1	W	W	7.21
Miscellaneous stone	7	400	1,640	4.10	8	373	2,410	6.47
Total or average	XX	3,550 r/	21,200 r/	5.98	XX	3,650	21,100	5.78

r/ Revised. W Withheld to avoid disclosing company proprietary data; included in "Total." XX Not applicable.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 3
MAINE: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+1 1/2 inch):			
Riprap and jetty stone	7	$61	$8.71
Filter stone	30	204	6.80
Other coarse aggregate	61	536	8.79
Coarse aggregate, graded:			
Concrete aggregate, coarse	206	1,000	4.85
Bituminous aggregate, coarse	275	1,960	7.14
Railroad ballast	W	W	7.47
Fine aggregate (-3/8 inch):			
Stone sand, concrete	63	399	6.33
Stone sand, bituminous mix or seal	(3/)	(3/)	10.40
Screening, undesignated	67	373	5.57
Other fine aggregate	79	552	6.99
Coarse and fine aggregates:			
Crusher run or fill or waste	(3/)	(3/)	3.77
Other coarse and fine aggregates	1,300	7,000	5.37
Other construction materials	9	47	5.22
Chemical and metallurgical:			
Cement manufacture	W	W	5.51
Lime manufacture	W	W	5.40
Unspecified: 4/			
Reported	438	2,530	5.77
Estimated	510	3,000	5.96
Total or average	3,650	21,100	5.78

W Withheld to avoid disclosing company proprietary data; included with "Grand total."

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Includes granite, limestone, miscellaneous stone, quartzite, slate, and traprock.

3/ Withheld to avoid disclosing company proprietary data; included with "Other."

4/ Reported and estimated production without a breakdown by end use.

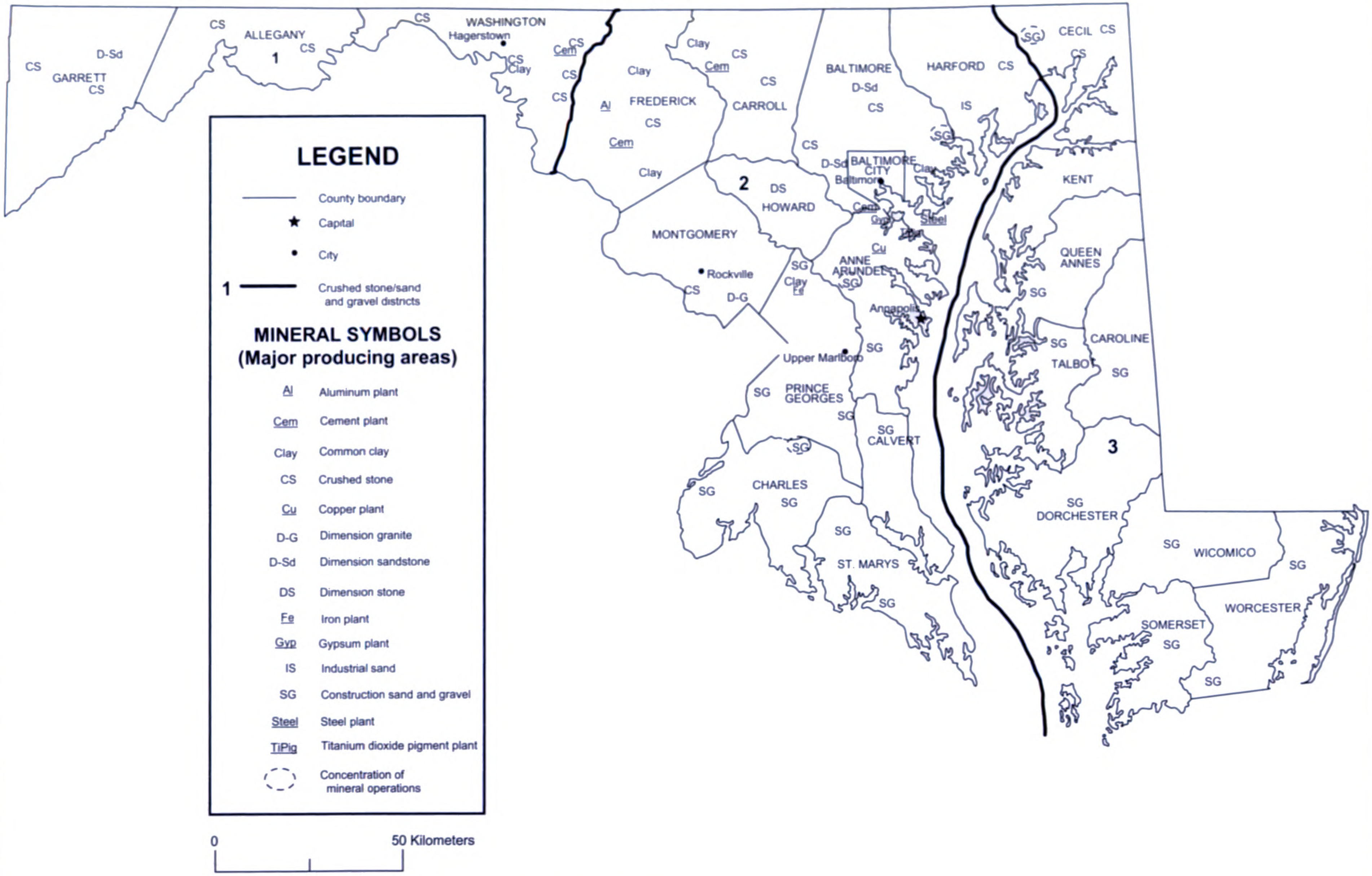
TABLE 4
MAINE: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate and concrete products	947	$4,020	$4.25
Asphaltic concrete aggregates and other bituminous mixtures	1,320	7,050	5.32
Road base and coverings	2,030	7,260	3.57
Road stabilization (lime)	24	48	2.00
Fill	856	2,040	2.39
Snow and ice control	385	1,650	4.29
Railroad ballast	35	125	3.57
Other miscellaneous uses	205	692	3.38
Unspecified: 2/			
Reported	1,250	2,990	2.40
Estimated	2,600	12,000	4.49
Total or average	9,670	37,600	3.89

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Reported and estimated production without a breakdown by end use.

MARYLAND



Source: Maryland Department of the Environment/U.S. Geological Survey (2001)

THE MINERAL INDUSTRY OF MARYLAND

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Maryland Department of the Environment, Minerals, Oil, and Gas Division for collecting information on all nonfuel minerals.

In 2001, the estimated value[1] of nonfuel mineral production for Maryland was $356 million, based upon preliminary U.S. Geological Survey (USGS) data. This was a marginal decrease from that of 2000[2] and followed a 13.2% increase in value in 2000 from 1999. The State ranked 33d (34th in 2000) among the 50 States in total nonfuel raw mineral production value, of which Maryland accounted for almost 1% of the U.S. total. Because data for crushed marble, shell, and traprock and industrial sand and gravel have been withheld to protect company proprietary data, the actual total values for 1999-2001 are (moderately) higher than those reported in table 1.

In 2001, crushed stone, by value, was Maryland's leading nonfuel mineral, followed by cement (portland and masonry) and construction sand and gravel. These three mineral commodities accounted for nearly 99% of the State's total value (table 1). All commodities' production and value remained relatively steady and close to 2000 levels, unlike most of the nonfuel minerals from 1999 to 2000 (table 1). In 2000, most of the State's rise in value resulted from increases in construction sand and gravel, up $28.2 million, and crushed stone, up $16 million. A substantial increase in production and value also occurred in the crushed stone category of marble, shell, and traprock. The values of portland cement and dimension stone also were up, although in lesser amounts (descending order of change). Decreases occurred in masonry cement, common clays, and industrial sand and gravel (table 1).

All nonfuel minerals mined in Maryland were industrial minerals. Compared with USGS estimates of the quantities of minerals produced in the other 49 States during 2001, the State was a significant producer of all of its major nonfuel raw mineral commodities—crushed stone, cement (portland and masonry), construction sand and gravel, and dimension stone (descending order of value). All metal production, in particular primary aluminum and raw steel, was processed from materials received from and other domestic and foreign sources. Based upon USGS data, the State rose to 9th from 11th among 13 States in the production of primary aluminum.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN MARYLAND 1/ 2/

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral	1999		2000		2001 p/	
	Quantity	Value	Quantity	Value	Quantity	Value
Cement:						
Masonry	110	10,000 e/	78	7,140 e/	70 e/	6,600 e/
Portland	1,730	124,000 e/	1,760	125,000 e/	1,730 e/	123,000 e/
Clays, common	335	1,380	271	982	271	982
Gemstones	NA	1	NA	1	NA	1
Sand and gravel, construction	8,970	56,500	13,100	84,700	12,700	83,500
Stone:						
Crushed 3/	22,200	121,000	24,500	137,000	24,000	139,000
Dimension metric tons	26,000	3,160	28,700	3,560	28,000	3,500
Combined values of sand and gravel (industrial) and stone (crushed marble, shell, traprock)	XX	(4/)	XX	(4/)	XX	(4/)
Total	XX	316,000	XX	358,000	XX	356,000

e/ Estimated. p/ Preliminary. NA Not available. XX Not applicable.

1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/ Data are rounded to no more than three significant digits; may not add to totals shown.

3/ Excludes certain stones; kind and value included with "Combined values" data.

4/ Value excluded to avoid disclosing company proprietary data.

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[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2001 USGS mineral production data published in this chapter are preliminary estimates as of August 2002 and are expected to change. For some mineral commodities, such as construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Specialist contact information may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals/contacts/comdir.html; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2] Values, percentage calculations, and rankings for 2000 may differ from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also change.

TABLE 2
MARYLAND: CRUSHED STONE SOLD OR USED, BY KIND 1/

Kind	1999 Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	2000 Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone	20 r	16,300 r/	$86,800 r/	$5.31 r/	18	18,400	$93,400	$5.06
Granite	3	4,180	27,600	6.60	3	4,070	28,600	7.02
Marble	1	W	W	W	1	W	W	W
Sandstone	3	112	731	6.53	3	115	948	8.24
Shell	1	W	W	W	1	W	W	W
Traprock	1	W	W	W	2	W	W	W
Miscellaneous Stone	1	1,520	6,060	3.98	2	1,840	14,300	7.76
Total or average	XX	22,200	121,000	5.47	XX	24,500	137,000	5.61

r/ Revised. W Withheld from total to avoid disclosing company proprietary data. XX Not applicable.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 3
MARYLAND: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+1 1/2 inch):			
Macadam	W	W	$5.83
Riprap and jetty stone	372	$3,880	10.44
Filter stone	54	460	8.52
Other coarse aggregate	31	203	6.55
Total or average	457	4,550	9.95
Coarse aggregate, graded:			
Concrete aggregate, coarse	631	5,740	9.10
Bituminous aggregate, coarse	238	2,140	8.97
Bituminous surface-treatment aggregate	771	5,980	7.76
Railroad ballast	W	W	6.17
Other graded coarse aggregate	2,910	19,200	6.59
Total or average	4,550	33,000	7.26
Fine aggregate (-3/8 inch):			
Stone sand, concrete	W	W	8.34
Stone sand, bituminous mix or seal	645	4,380	6.79
Screening, undesignated	41	270	6.59
Other fine aggregate	129	1,050	8.11
Total or average	815	5,700	6.99
Coarse and fine aggregates:			
Graded road base or subbase	1,260	9,340	7.40
Unpaved road surfacing	W	W	6.03
Crusher run or fill or waste	577	2,710	4.70
Other coarse and fine aggregates	4,600	21,100	4.59
Total or average	6,440	33,100	5.15
Chemical and metallurgical:			
Cement manufacture	2,560	8,360	3.27
Sulfur oxide removal	(3/)	(3/)	6.59
Unspecified: 4/			
Reported	9,350	50,600	5.41
Estimated	200	1,100	5.51
Total or average	9,550	51,700	5.41
Grand total or average	24,500	137,000	5.61

W Withheld to avoid disclosing company proprietary data; included with "Other."

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Includes granite, limestone, miscellaneous stone, and sandstone; excludes marble, shell, and traprock to avoid disclosing company proprietary data.

3/ Withheld to avoid disclosing company proprietary data; included in "Grand total."

4/ Reported and estimated production without a breakdown by end use.

TABLE 4
MARYLAND: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE AND DISTRICT 1/ 2/

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1 1/2 inch) 3/	35	240	W	W	W	W
Coarse aggregate, graded 4/	W	W	W	W	W	W
Fine aggregate (-3/8 inch) 5/	152	1,190	W	W	W	W
Coarse and fine aggregate 6/	W	W	4,010	18,800	W	W
Chemical and metallurgical 7/	W	W	W	W	--	--
Unspecified: 8/						
Reported	1,470	8,110	7,880	42,500	--	--
Estimated	--	--	200	1,000	--	--
Total	3,740	19,300	17,900	93,700	2,860	24,200

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes granite, limestone, miscellaneous stone, and sandstone; excludes marble, shell, and traprock from total to avoid disclosing company proprietary data.

3/ Includes filter stone, macadam, riprap and jetty stone, and other coarse aggregate.

4/ Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), railroad ballast, and other graded coarse aggregate.

5/ Includes screening (undesignated), stone sand (bituminous mix or seal), stone sand (concrete), and other fine aggregate.

6/ Includes crusher run (select material or fill), graded road base or subbase, unpaved road surfacing, and other coarse and fine aggregates.

7/ Includes cement manufacture, and sulfur oxide removal.

8/ Reported production without a breakdown by end use.

TABLE 5
MARYLAND: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	4,090	$28,300	$6.92
Concrete products (blocks, bricks, pipe, decorative, etc.)	4	27	6.75
Asphaltic concrete aggregates and other bituminous mixtures	339	1,680	4.94
Road base and coverings	41	70	1.71
Fill 2/	394	1,540	3.90
Unspecified: 3/			
Reported	5,550	40,400	7.28
Estimated	2,700	13,000	4.78
Total or average	13,100	84,700	6.48

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes filtration.

3/ Reported and estimated production without a breakdown by end use.

TABLE 6
MARYLAND: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

Use	Districts 1 and 2		District 3	
	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products	2,450	17,400	1,640	10,800
Asphaltic concrete aggregates and road base materials	W	W	W	W
Fill	W	W	W	W
Other miscellaneous uses 2/	432	1,610	343	1,670
Unspecified: 3/				
Reported	5,550	40,400	--	--
Estimated	1,800	7,200	860	5,500
Total	10,200	66,700	2,840	18,000

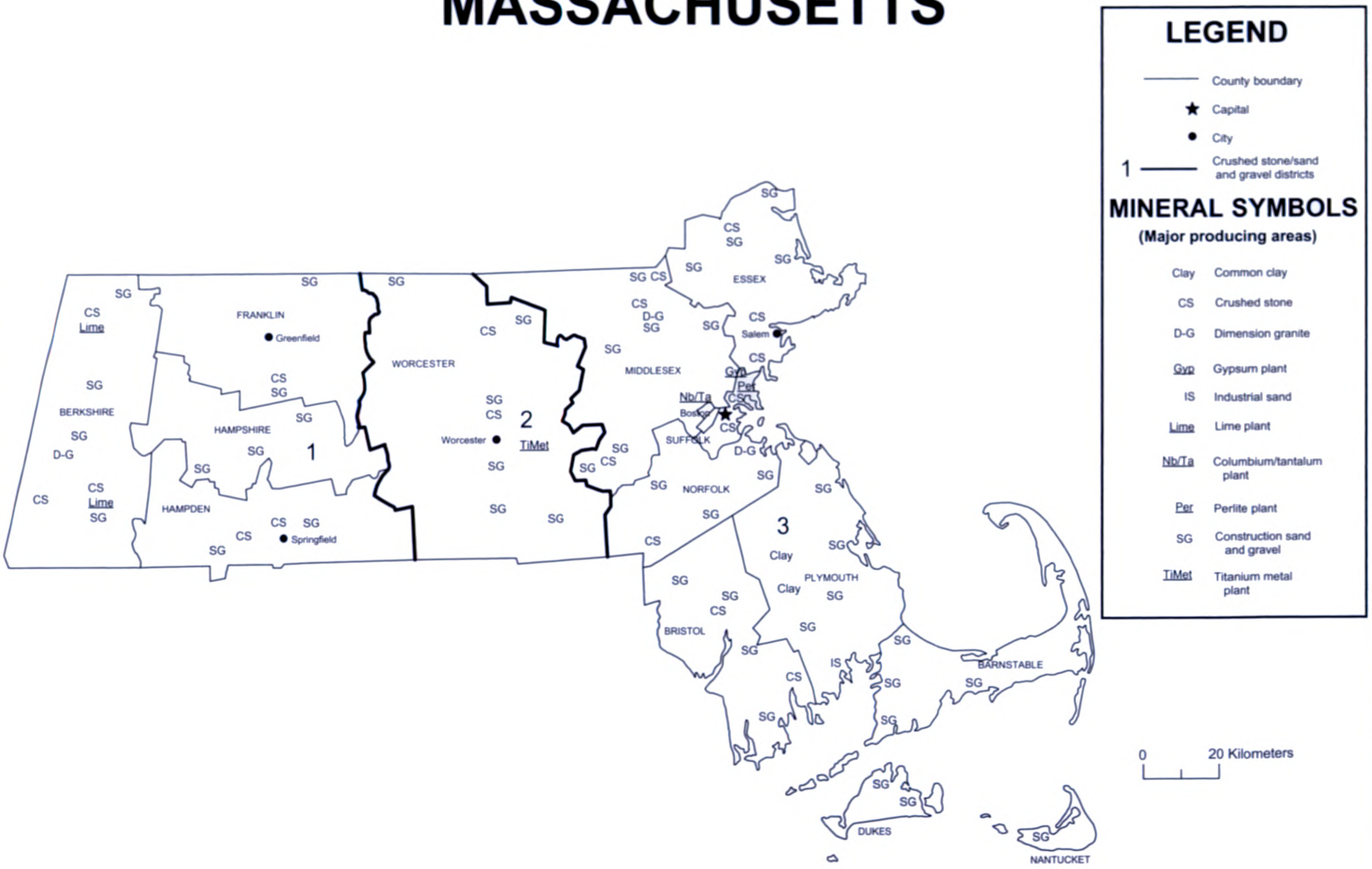
W Withheld to avoid disclosing company proprietary data, included with "Other miscellaneous uses." -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes filtration.

3/ Reported and estimated production without a breakdown by end use.

MASSACHUSETTS



Source: Massachusetts Executive Office of Environmental Affairs/U.S. Geological Survey (2001)

THE MINERAL INDUSTRY OF MASSACHUSETTS

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Massachusetts Executive Office of Environmental Affairs for collecting information on all nonfuel minerals.

In 2001, the estimated value[1] of nonfuel mineral production for Massachusetts was $209 million, based upon preliminary U.S. Geological Survey (USGS) data. This was about a 5% increase from that of 2000[2] and followed a 3.6% increase in 2000 from 1999.

Massachusetts' leading nonfuel mineral commodities by value were crushed stone, construction sand and gravel, and dimension stone. In 2001, the increased crushed stone and construction sand and gravel values accounted for all of the State's increase in nonfuel mineral production value. These increases more than offset decreases that occurred in dimension stone and lime (table 1). In 2000, increases of $13.1 million in crushed stone and $4.9 million in construction sand and gravel (alongside a smaller yet significant increase in lime) accounted for nearly all of the State's increase in nonfuel mineral production value. Only dimension stone was down slightly (table 1). Based upon USGS estimates of the quantities produced in the United States in 2001, Massachusetts continued to be sixth among those States having dimension stone production.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN MASSACHUSETTS 1/ 2/

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral	1999 Quantity	1999 Value	2000 Quantity	2000 Value	2001 p/ Quantity	2001 p/ Value
Clays, common	W	W	36 e/	321 e/	36	321
Gemstones	NA	1	NA	1	NA	1
Sand and gravel, construction	12,700	75,200	13,200	80,100	13,200	81,300
Stone:						
Crushed	11,600	89,900	13,400	103,000	14,000	111,000
Dimension metric tons	70,400	16,900	69,600	16,800	69,000	16,000
Combined values of lime, sand and gravel [industrial (1999)], and values indicated by symbol W	XX	10,800	XX	(3/)	XX	(3/)
Total	XX	193,000	XX	200,000	XX	209,000

e/ Estimated. p/ Preliminary. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined values" data. XX Not applicable.

1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/ Data are rounded to no more than three significant digits; may not add to totals shown.

3/ Value excluded to avoid disclosing proprietary data.

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[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2001 USGS mineral production data published in this chapter are preliminary estimates as of August 2002 and are expected to change. For some mineral commodities, such as construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Specialist contact information may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals/contacts/comdir.html; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2] Values, percentage calculations, and rankings for 2000 may differ from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also change.

TABLE 2
MASSACHUSETTS: CRUSHED STONE SOLD OR USED, BY KIND 1/

	1999				2000			
Kind	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone 2/	4 r/	786 r/	$7,900 r/	$10.05 r/	4	879	$12,600	$14.31
Dolomite	1	W	W	8.00	1	W	W	4.35
Granite	8 r/	4,270 r/	32,900 r/	7.71 r/	8	5,210	37,500	7.19
Traprock	20 r/	6,220 r/	46,100 r/	7.41 r/	20	6,700	48,600	7.25
Miscellaneous stone	3	W	W	8.34	3	W	W	7.95
Total or average	XX	11,600	89,900	7.73	XX	13,400	103,000	7.69

r/ Revised. W Withheld to avoid disclosing company proprietary data, included in "Total." XX Not applicable.

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Includes limestone-dolomite, reported with no distinction between the two.

TABLE 3
MASSACHUSETTS: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+1 1/2 inch):			
Macadam	W	W	$8.52
Riprap and jetty stone	W	W	8.14
Filter stone	W	W	7.63
Other coarse aggregates	165	$1,520	9.21
Coarse aggregate, graded:			
Concrete aggregate, coarse	693	4,460	6.43
Bituminous aggregate, coarse	1,760	13,000	7.38
Bituminous surface-treatment aggregate	W	W	11.44
Railroad ballast	W	W	9.27
Other graded coarse aggregate	492	5,300	10.78
Fine aggregate (-3/8 inch):			
Stone sand, concrete	214	1,440	6.71
Stone sand, bituminous mix or seal	W	W	5.87
Screening, undesignated	221	1,090	4.91
Other fine aggregate	367	2,330	6.34
Coarse and fine aggregates:			
Graded road base or subbase	496	3,110	6.28
Unpaved road surfacing	W	W	11.08
Crusher run or fill or waste	755	5,100	6.75
Roofing granules	W	W	11.41
Other coarse and fine aggregates	287	1,960	6.82
Other construction materials	420	3,310	7.89
Agricultural:			
Agricultural limestone	W	W	6.63
Poultry grit and mineral food	W	W	16.14
Other agricultural uses	65	465	7.15
Chemical and metallurgical:			
Lime manufacture	(3/)	(3/)	6.83
Flux stone	(3/)	(3/)	4.00
Special:			
Whiting or whiting substitute	(3/)	(3/)	(3/)
Other fillers or extenders	(3/)	(3/)	(3/)
Unspecified: 4/			
Reported	4,160	30,200	7.26
Estimated	2,800	21,000	7.72
Total or average	13,400	103,000	7.69

W Withheld to avoid disclosing company proprietary data; included with "Other."

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Includes dolomite, granite, limestone, limestone-dolomite, miscellaneous stone, and traprock.

3/ Withheld to avoid disclosing company proprietary data; included in "Total."

4/ Reported and estimated production without a breakdown by end use.

TABLE 4
MASSACHUSETTS: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1 1/2 inch) 2/	W	W	W	W	W	W
Coarse aggregate, graded 3/	--	--	W	W	W	W
Fine aggregate (-3/8 inch) 4/	W	W	W	W	770	4,590
Coarse and fine aggregate 5/	--	--	W	W	W	W
Other construction materials	63	1,040	111	458	246	1,820
Agricultural 6/	W	W	--	--	--	--
Chemical and metallurgical 7/	W	W	--	--	--	--
Special 8/	W	W	--	--	--	--
Unspecified: 9/						
Reported	1,470	11,200	308	2,380	2,380	16,600
Estimated	310	2,400	820	6,300	1,600	13,000
Total	2,430	23,400	2,420	19,100	8,530	60,200

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes filter stone, macadam, riprap and jetty stone, and other coarse aggregate.

3/ Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), railroad ballast, and other graded coarse aggregate.

4/ Includes screening (undesignated), stone sand (bituminous mix or seal), stone sand (concrete), and other fine aggregate.

5/ Includes crusher run (select material or fill), graded road base or subbase, roofing granules, unpaved road surfacing, and other coarse and fine aggregates.

6/ Includes agricultural limestone, poultry grit and mineral food, and other agricultural uses.

7/ Includes flux stone and lime manufacture.

8/ Includes other fillers or extenders and whiting or whiting substitute.

9/ Reported and estimated production without a breakdown by end use.

TABLE 5
MASSACHUSETTS: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	2,470	$18,300	$7.42
Plaster and gunite sands	53	573	10.81
Concrete products (blocks, bricks, pipe, decorative, etc.)	54	332	6.15
Asphaltic concrete aggregates and other bituminous mixtures	197	2,240	11.35
Road base and coverings	1,160	6,560	5.66
Fill	976	3,130	3.21
Snow and ice control	306	1,590	5.18
Roofing granules	2	31	15.50
Filtration	81	606	7.48
Other miscellaneous uses	16	148	9.25
Unspecified: 2/			
Reported	1,760	8,770	4.97
Estimated	6,100	38,000	6.17
Total or average	13,200	80,100	6.07

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Reported and estimated production without a breakdown by end use.

TABLE 6
MASSACHUSETTS: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products 2/	W	W	W	W	1,530	11,600
Asphaltic concrete aggregates and road base materials	633	4,040	438	3,110	285	1,650
Fill	265	742	289	940	422	1,450
Snow and ice control	W	W	W	W	185	873
Other miscellaneous uses 3/	267	2,270	1,000	6,890	--	--
Unspecified: 4/						
Reported	176	769	1,120	6,820	470	1,190
Estimated	1,400	7,300	830	3,600	3,900	27,000
Total	2,760	15,100	3,680	21,300	6,770	43,700

W Withheld to avoid disclosing company proprietary data; included with "Other miscellaneous uses." -- Zero.

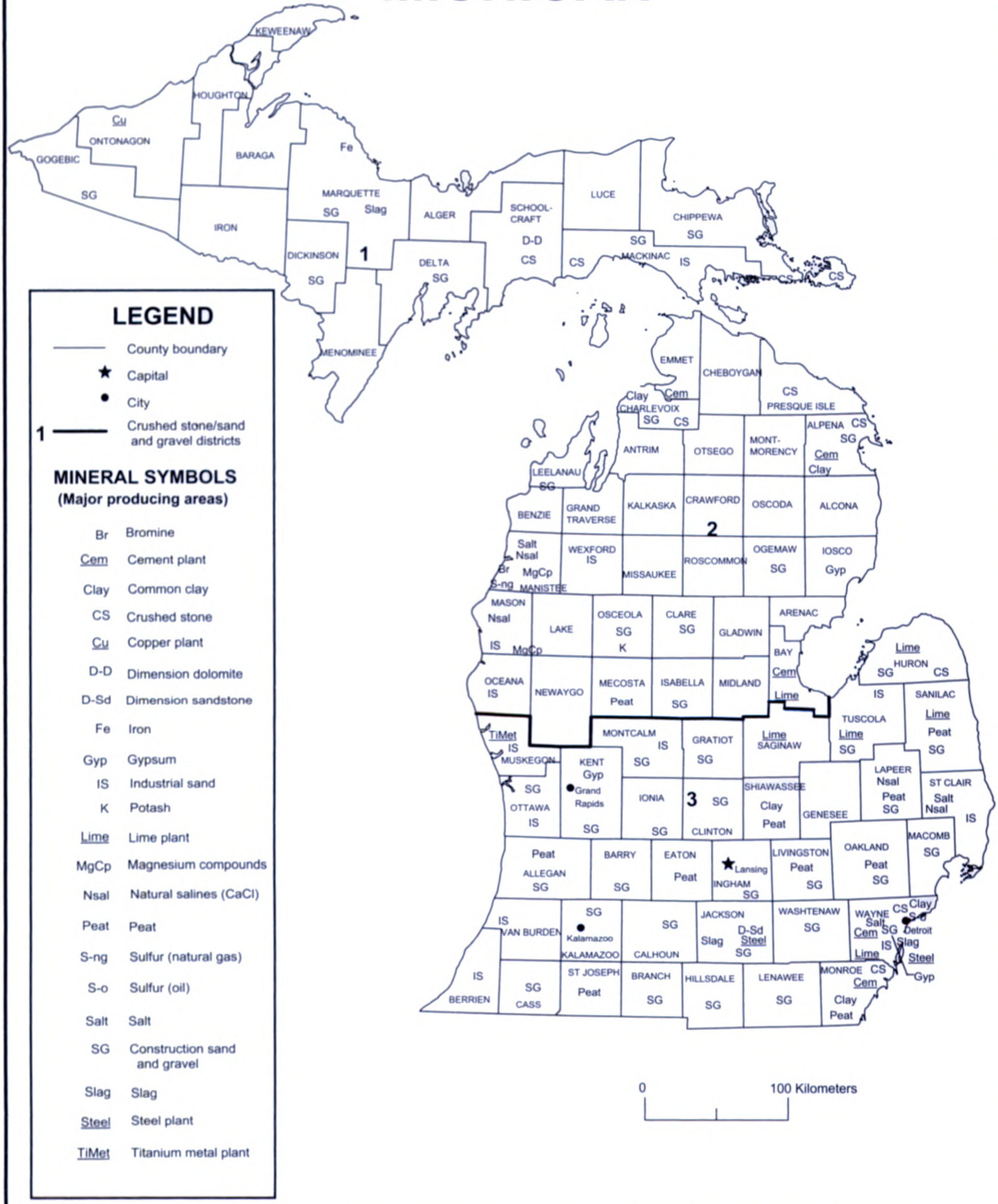
1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes plaster and gunite sands.

3/ Includes filtration and roofing granules.

4/ Reported and estimated production without a breakdown by end use.

MICHIGAN



Source: Michigan Department of Environmental Quality, Geological Survey Division/U.S. Geological Survey (2001)

THE MINERAL INDUSTRY OF MICHIGAN

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Michigan Department of Environmental Quality, Geological Survey Division, for collecting information on all nonfuel minerals.

In 2001, the estimated value[1] of nonfuel mineral production for Michigan was $1.62 billion, based upon preliminary U.S. Geological Survey (USGS) data. This was a 1% decrease from that of 2000[2] and followed a 4.5% increase in 2000 from 1999. The State continued as sixth in rank among the 50 States in total nonfuel mineral production value, of which Michigan accounted for more than 4% of the U.S. total.

Michigan continued to be the Nation's second leading iron ore-producing State in 2001. Although iron ore production represented a very significant percentage of the State's nonfuel mineral economy, portland cement (for the third consecutive year) was Michigan's leading nonfuel mineral commodity. Iron ore was second, followed by construction sand and gravel, crushed stone, magnesium compounds, and salt. In 2001, cement (masonry and portland) represented almost 30% of the State's total nonfuel mineral production value. When cement is combined with the values of Michigan's other major construction materials—construction sand and gravel, crushed stone, and gypsum (in descending order of value)—the total accounted for about 58% of the State's total value as shown in table 1.

In 2000, increases of about $24 million each in salt and construction sand and gravel (descending order of change), about $12 million each in magnesium compounds and cement (portland and masonry), $8 million and $4 million, respectively, in crushed stone and gypsum, plus smaller increases in potash and peat more than offset the only decreases of $1 million or more in bromine, iron ore, and lime. All other changes were small and had little effect on the net results.

Compared with USGS estimates of the quantities produced in the other 49 States in 2001, Michigan remained first in magnesium compounds; second in iron ore, industrial sand and gravel, and peat, as well as second of two bromine-producing States; third in construction sand and gravel and third of three States that produce potash; fourth in portland cement; and seventh in masonry cement. Additionally, the State was a significant producer of crushed stone, lime, common clays, and dimension stone (listed in descending order of value). Michigan rose to third from fourth in the Nation in the manufacture of raw steel with an output of 6.13 million metric tons, as reported by the American Iron and Steel Institute.

The following narrative information was provided by the Michigan Department of Environmental Quality (MDEQ), Geological and Land Management Division, and the Michigan Department of Natural Resources (MDNR), Forestry, Mineral, and Fire Management Division.[3] Iron ore production declined in 2001 because of depressed market conditions. Cleveland-Cliffs Inc. (CCI) continued mining and processing of iron ore at the Empire Mine and at the Tilden Mine in the western Upper Peninsula. The Empire and Tilden mines collectively produce plain and fluxed pellets and a small amount of siliceous iron ore that is shipped to steel mills in the United States and Canada for processing. The depressed market conditions resulted in a decrease in production at both mines. CCI announced in November that it would permanently reduce the production capacity of the Empire Mine to about 6 million metric tons per year (Mt/yr) from about 8 Mt/yr. The workforce was also reduced by 300. LTV Steel Co., a partner in the Empire Mine, filed for protection under the Chapter 11 bankruptcy laws (Skillings Mining Review, 2001a). Production at the Tilden Mine was also scaled back, and a pelletizing kiln problem curtailed production. Adverse market conditions also affected the users of CCI's pellets. Rouge Steel Co. in Detroit cut production significantly. Algoma Steel, Inc. of Sault Ste. Marie, Ontario, Canada, announced a restructuring early in 2001, and CCI acquired Algoma's 45% interest in the Tilden Mine (Skillings Mining Review, 2001b).

The Caledonia Mine, in Ontonagon County of the western Upper Peninsula, is Michigan's only active copper mine. Red Metal Minerals operates the mine, producing a very limited quantity of copper, silver, and other mineral specimens for sale to mineral collectors and museums. White Pine Copper Refinery, Inc. continued to process imported anode copper at its electrolytic refinery adjacent to the former White Pine copper mine in Ontonagon County.

Michigan continued to be a major producer of nonmetallic minerals, including gypsum, potash, salt, sand and gravel, stone, and others. Sibley Limestone LLC moved into the old Michigan Foundation Quarry Co. operations at the Sibley Quarry in Trenton, near Detroit. It has a 10-year contract to mine limestone for the Detroit Edison Co.

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[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2001 USGS mineral production data published in this chapter are preliminary estimates as of August 2002 and are expected to change. For some mineral commodities, such as construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Specialist contact information may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals/contacts/comdir.html; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2] Values, percentage calculations, and rankings for 2000 may differ from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also change.

[3] The text of the State mineral industry information was authored by Milton A. Gere, Jr., Geologist, Minerals and Land Management Section, Forestry, Mineral, and Fire Management Division, Michigan Department of Natural Resources, and Paul Sundeen, Resource/Mine Reclamation Specialist (retired), Geological and Land Management Division, Michigan Department of Environmental Quality.

USG Corp., parent of U.S. Gypsum Co., filed for Chapter 11 bankruptcy court protection resulting from building product asbestos content liability. U.S. Gypsum has a gypsum quarry at Alabaster in Iosco County.

Local opposition to aggregate mining stirred controversies mainly in the Grand Rapids area of the western Lower Peninsula. Zoning provisions and court challenges resulted in restrictions on hours of operation, truck routes, and duration of mining operations at five different aggregate mining operations.

Studies by Dr. Alan Arbogast, Department of Geography, Michigan State University, East Lansing, indicated that some sand dunes have grown as much as 9 meters (m) in the past 500 years. Prior to this, many thought that the dunes stopped forming 5,000 years ago. The new information is not expected to affect regulation of mining of Michigan's dunes for industrial sand (Michigan State University, 2001).

At of the end of 2001, there were 12 active sand dune mining operations in the State, all located along the Lake Michigan shoreline. The dunes are the source of about 90% of the foundry sand used in the automobile industry. A property owners' group challenged the issuance of a permit for sand dune mining in Berrien County, alleging that the operator was not qualified for a permit under the law. The Circuit Court ruled in favor of the MDEQ and the mine operator. The case was appealed to the Michigan Court of Appeals.

Exploration companies conducted fieldwork exploring for nonferrous and precious metals on a mixture of Federal, State, and privately owned lands. Exploration efforts are expected to continue in 2002. The MDEQ reported that two companies have drilled 14 exploration drill holes totaling nearly 1,640 m in two counties on private leases in fiscal year 2001. Drilling is expected to continue periodically as exploration takes place in 2002.

Bitterroot Resources, Ltd., and Kennecott Exploration Co. announced an option/joint-venture agreement covering copper, nickel, palladium, platinum, and targets in Michigan's Upper Peninsula. The bedrock of the 82-square-kilometer area consists of Early Proterozoic aged sediments and Middle Proterozoic (Keweenawan age) intrusives, lava flows, and sediments. Palladium mineralization, along with some copper, gold, nickel, and platinum values equaling 0.25 gram to 0.40 gram per metric ton were located on a State of Michigan metallic mineral lease from surface rock samples. The discovery was made while exploring 570 hectares of mineral land leases to Yooper Exploration Services Inc. (Skillings Mining Review, 2001c).

A 15-metric-ton native copper boulder was hoisted from the bottom of Lake Superior in early July and placed on display at the Quincy Mine Hoist Museum, Hancock, MI, by the A.E. Seaman Mineral Museum (SMM), of Michigan Technological University, Houghton, MI (Barron, 2001). The copper specimen belongs to the State and is on loan to the SMM through an agreement with the MDNR. The SMM continued to raise money to build a new museum facility at the Quincy location.

In 2000, the State capped a collapsed abandoned shaft of the former Chapin Iron Mine at Iron Mountain, Dickinson County, at a cost of $140,000. The capping prevented drainage of ground water and caused flooding of the lower level of the adjacent Cornish Pump Museum. Plans to drill a drain hole/mine vent in the new reinforced concrete mine cap were discussed.

The MDNR continued to update the Abandoned Underground Mine Inventory and to review and to repair public safety problems at old mine sites on State-owned lands. Two small contracts were let for review and updating activities. The MDNR contracted for fencing and/or capping at 29 abandoned mine shafts in four counties. The MDNR also participated in the U.S. Department of Labor's Mine Safety and Health Administration's 2001 "Stay Out, Stay Alive" campaign.

In May, expansion of cave-ins at an abandoned iron mine in Iron County caused concern over possible impacts to a sewer line and a nearby local road. The Mine Inspector and local officials sought funding to repair the problem.

An idle underground gypsum mine at Wyoming, Kent County, has long been used for storage of food and other dry items by the Michigan Natural Storage Company. However, in 2001, part of the 26-m-deep mine was converted to a computer data center and went online in July as Underground Secure Data Center Operations. The mine has a constant temperature of 50 degrees Fahrenheit, a constant low humidity, and provides security for the data stored there (Grand Rapids Press, 2001).

Early in 2001, the U.S. Great Lakes shipping of coal, iron ore, and other materials was dependent on the U.S. Coast Guard icebreakers. The largest icebreaker, Mackinaw, built in 1944, needs replacing. Funds have been approved, and the contract was to be awarded in September. Low water levels in the Great Lakes affected mineral product shipping because of shallow water in the channels and loading facilities.

The Canadian National Railway Company (CN) announced in September that it had acquired Wisconsin Central Transportation Corporation (WC). WC runs the Escanaba iron ore dock and hauls much of the iron ore pellets in Michigan's Upper Peninsula.

In December 2001, vessel shipments of iron ore from the Escanaba dock for the year totaled 5.7 million metric tons (Mt), and shipments from the Marquette dock totaled 6.9 Mt.

The MDNR manages leasing of State-owned lands for the exploration and development of metallic and nonmetallic minerals, oil and gas, and underground gas storage. Most of the lease and royalty revenues goes to the Michigan Natural Resources Trust Fund, which is used to purchase and maintain public recreation lands and facilities.

The production of nonmetallic minerals from State-owned land continued to be an important source of locally utilized materials for road and other construction purposes. During fiscal year 2001, total income from nonmetallic minerals activities on State lands was $1,142,863. One direct lease was issued during fiscal year 2001 for expansion and reclamation of a sand and gravel pit in Oakland County.

The State of Michigan allows private companies to lease land in order to produce minerals. In some cases, the companies are only involved in exploration and development, and, in other cases, they may be mining a deposit. In fiscal year 2001, the State received 9 lease applications and issued 64 direct leases for metallic minerals in the western part of the Upper Peninsula. The MDNR received eight exploration plans for mineral exploration on State lands and approved five plans. The MDNR will continue reviewing and processing of pending applications and mining plans in fiscal year 2002. Total income in 2001 from metallic minerals activities on State lands was $122,063. One company announced that they discovered palladium mineralization on a State metallic mineral lease.

References Cited

Barron, R.J., 2001, Underwater trolling for copper: Skillings Mining Review, v. 90, no. 38, September 8, p. 4-6.

Grand Rapids Press, 2001, On guard underground: Grand Rapids Press, November 24, p. D4.

Michigan State University, 2001, State News: East Lansing, MI, Michigan State University, November 15, p. 1.

Skillings Mining Review, 2001a, Cleveland-Cliffs to lay off 30 salaried workers at Empire Mine: Skillings Mining Review, v. 90, no. 6, February 10, p. 8.

Skillings Mining Review, 2001b, Cliffs to acquire another 45% of Tilden Mine: Skillings Mining Review, v. 90, no. 45, November 17, p. 9.

Skillings Mining Review, 2001c, Palladium find in upper Michigan: Skillings Mining Review, v. 90, no. 14, April 7, p. 4.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN MICHIGAN 1/ 2/

(Thousand metric tons and thousand dollars)

Mineral	1999		2000		2001 p/	
	Quantity	Value	Quantity	Value	Quantity	Value
Cement:						
Masonry	283	28,100 e/	296	28,900 e/	280 e/	27,600 e/
Portland	5,810	439,000 e/	5,790	450,000 e/	5,810 e/	452,000 e/
Clays, common	615	3,550	594	3,210	594	3,210
Gemstones	NA	1	NA	1	NA	1
Gypsum, crude	2,170	15,700	1,980	19,800	1,820	19,500
Lime	781	43,900	W	W	W	W
Peat	195	4,520	207	5,750	202	5,220
Sand and gravel:						
Construction	70,200	245,000	75,600	269,000	77,200	279,000
Industrial	2,550	28,100	2,520	27,800	2,610	31,400
Stone, crushed 3/	41,200 r/	140,000 r/	42,200	148,000	42,500	154,000
Combined values of bromine, iron ore (usable), iron oxide pigments (crude), magnesium compounds, potash, salt, stone (crushed marl and miscellaneous, dimension dolomite and sandstone), and values indicated by symbol W	XX	625,000	XX	691,000	XX	651,000
Total	XX	1,570,000 r/	XX	1,640,000	XX	1,620,000

e/ Estimated. p/ Preliminary. r/ Revised. W Withheld to avoid disclosing company proprietary data; value included with "Combined values" data.

XX Not applicable.

1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/ Data are rounded to no more than three significant digits; may not add to totals shown.

3/ Excludes certain stones; kind and value included with "Combined values" data.

TABLE 2
MICHIGAN: CRUSHED STONE SOLD OR USED, BY KIND 1/

	1999				2000			
Kind	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone 2/	22	32,700	$100,000	$3.36	23	34,400	$118,000	$3.43
Dolomite	5 r/	8,440 r/	29,900 r/	3.54 r/	5	7,770	30,300	3.90
Calcareous marl	1	W	W	W	1	W	W	W
Sandstone	1	12	195	16.25	1	12	195	16.25
Miscellaneous stone	1	W	W	W	1	W	W	W
Total or average	XX	41,200 r/	140,000 r/	3.40 r/	XX	42,200	148,000	3.52

r/ Revised. W Withheld to avoid disclosing company proprietary data. XX Not applicable.

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Includes limestone-dolomite reported with no distinction between the two.

TABLE 3
MICHIGAN: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+1 1/2 inch):			
Macadam	W	W	$5.43
Riprap and jetty stone	140	$2,310	16.48
Filter stone	W	W	6.03
Other coarse aggregate	75	665	8.87
Coarse aggregate, graded:			
Concrete aggregate, coarse	3,060	12,700	4.17
Bituminous aggregate, coarse	969	4,500	4.65
Bituminous surface-treatment aggregate	W	W	6.50
Railroad ballast	35	179	5.11
Other graded coarse aggregate	15	62	4.13
Fine aggregate (-3/8 inch):			
Stone sand, concrete	W	W	3.44
Stone sand, bituminous mix or seal	339	1,720	5.07
Screening, undesignated	297	1,050	3.53
Coarse and fine aggregates:			
Graded road base or subbase	1,370	6,090	4.45
Unpaved road surfacing	201	708	3.52
Crusher run or fill or waste	W	W	3.50
Other coarse and fine aggregates	1,050	4,340	4.14
Other construction materials	5	37	7.40
Agricultural, limestone	71	592	8.34
Chemical and metallurgical:			
Cement manufacture	6,490	13,400	2.07
Lime manufacture	W	W	3.47
Flux stone	W	W	4.07
Unspecified: 3/			
Reported	22,300	78,600	3.53
Estimated	2,400	8,100	3.37
Total or average	42,200	148,000	3.52

W Withheld to avoid disclosing company proprietary data; included in "Total."

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Includes, dolomite, limestone, limestone-dolomite, and sandstone; excludes calcareous marl and cellaneous stone to avoid miscellaneous stone.

3/ Reported and estimated production without a breakdown by end use.

TABLE 4
MICHIGAN: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE AND DISTRICT 1/ 2/

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1 1/2 inch) 3/	W	W	W	W	149	1,980
Coarse aggregate, graded 4/	W	W	W	W	898	4,420
Fine aggregate (-3/8 inch) 5/	W	W	W	W	W	W
Coarse and fine aggregate 6/	W	W	W	W	(7/)	(7/)
Other construction materials	--	--	5	37	(7/)	(7/)
Agricultural 8/	W	W	W	W	W	W
Chemical and metallurgical 9/	W	W	W	W	W	W
Unspecified: 10/						
Reported	3,750	12,400	13,800	45,600	4,730	20,600
Estimated	820	2,700	--	--	1,600	5,400
Total	11,100	40,400	20,900	63,600	10,200	44,500

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes dolomite, limestone, limestone-dolomite, and sandstone; excludes calcareous marl and miscellaneous stone to avoid disclosing company proprietary data.

3/ Includes filter stone, macadam, riprap and jetty stone, and other coarse aggregate.

4/ Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), railroad ballast, and other graded coarse aggregate.

5/ Includes stone sand (bituminous mix or seal), stone sand (concrete), and screening (undesignated).

6/ Includes crusher run (select material or fill), graded road base or subbase, unpaved road surfacing, and other coarse and fine aggregates.

7/ Less than ½ unit.

8/ Includes agricultural limestone.

9/ Includes cement manufacture, flux stone, and lime manufacture.

10/ Reported and estimated production without a breakdown by end use.

TABLE 5
MICHIGAN: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	7,500	$29,000	$3.86
Plaster and gunite sands	132	785	5.95
Concrete products (blocks, bricks, pipe, decorative, etc.)	206	1,150	5.57
Asphaltic concrete aggregates and other bituminous mixtures	6,030	25,900	4.30
Road base and coverings	11,100	35,400	3.20
Road stabilization (cement)	472	1,810	3.83
Road stabilization (lime)	761	1,390	1.83
Fill	8,450	19,000	2.25
Snow and ice control	731	2,220	3.03
Railroad ballast	30	320	10.67
Filtration	134	446	3.33
Other miscellaneous uses	386	2,250	5.83
Unspecified: 2/			
Reported	22,000	84,200	3.82
Estimated	18,000	65,000	3.67
Total or average	75,600	269,000	3.55

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Reported and estimated production without a breakdown by end use.

TABLE 6
MICHIGAN: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3		Unspecified districts	
Use	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products 2/	109	584	966	3,970	6,770	26,300	--	--
Asphaltic concrete aggregates and other bituminous mixtures	69	841	760	3,280	5,200	21,800	--	--
Road base and coverings 3/	608	1,790	2,190	6,150	9,510	30,700	--	--
Fill	168	194	495	770	7,790	18,000	--	--
Snow and ice control	110	191	130	299	491	1,730	--	--
Other miscellaneous uses 4/	--	--	42	418	508	2,600	--	--
Unspecified: 5/								
Reported	138	248	300	1,100	21,600	82,800	25	42
Estimated	2,100	8,300	3,500	12,000	12,000	44,000	260	730
Total	3,270	12,100	8,370	28,000	63,600	228,000	283	774

-- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

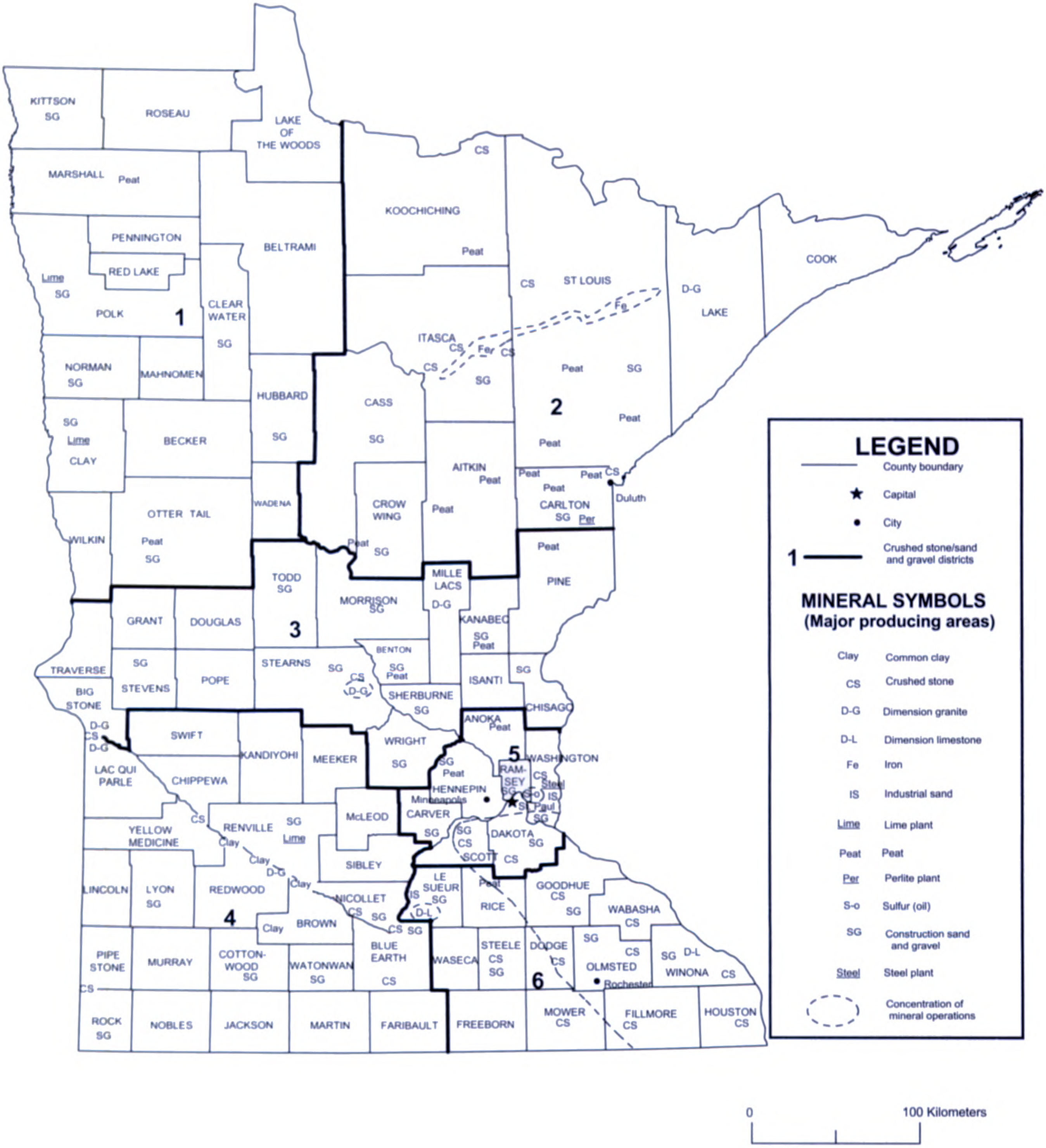
2/ Includes plaster and gunite sands.

3/ Includes road and other stabilization (cement and lime).

4/ Includes filtration and railroad ballast.

5/ Reported and estimated production without a breakdown by end use.

MINNESOTA



Source: Minnesota Department of Natural Resources, Division of Lands and Minerals/U.S. Geological Survey (2001)

THE MINERAL INDUSTRY OF MINNESOTA

In 2001, the estimated value[1] of nonfuel mineral production for Minnesota was $1.44 billion, based on preliminary U.S. Geological Survey (USGS) data. This was a decrease from that of 2000[2] and followed a 3.5% increase from 1999 to 2000. The State continued to be eighth in rank among the 50 States in total nonfuel mineral production value, of which Minnesota accounted for about 3% of the U.S. total.

In 2001, iron ore, by value, remained Minnesota's leading nonfuel raw mineral, followed by construction sand and gravel, crushed stone, industrial sand and gravel, dimension stone, and lime. In 2000, Minnesota's increase in value resulted mostly from the increased values of iron ore, up $30 million, construction sand and gravel, up $16 million, and crushed stone and lime, up more than $5 million and $1 million each, respectively; the only significant decrease was a more than $8 million drop in the value of industrial sand and gravel (table 1).

Compared with USGS estimates of the quantities produced in the other 49 States in 2001, Minnesota remained first in the Nation in iron ore and third in peat. Additionally, the State produced significant quantities of construction and industrial sand and gravel and dimension stone.

The following narrative information was provided by the Minnesota Department of Natural Resources' Division of Lands and Minerals[3] (DLM). Production data in the following text are those reported by the DLM, based upon its own surveys and estimates. The data may differ from some production figures reported by the USGS. Minnesota continued to rank first in the Nation in iron ore production, accounting for 70% of 2001 domestic iron ore shipments to the U.S. steel industry. Although the uncertain market and financial situation of the Nation's integrated steel mills had a significant effect on Minnesota's iron ore production, iron ore mining continued to rank among the State's largest industries, contributing more than $1 billion annually to Minnesota's economy.

Iron ore production in Minnesota dropped to 34 million metric tons (Mt) in 2001 from 48 Mt in 2000, a decrease of 14 Mt. About half that reduction was due to the permanent closure of LTV Steel Mining Co. Inc. on January 5, 2001. The remaining reduction was due to production cutbacks at five of the six remaining taconite operations.

Because of economic losses of Minnesota's taconite companies and competition from imported subsidized steel, the State responded with several initiatives. It lowered production taxes for all Minnesota taconite companies, it reduced royalty rates for those companies mining State of Minnesota owned ore, and it created a new grant program to encourage capital investment in the taconite industry.

Minnesota has recorded some success in a long-term effort to promote value-added iron production. Kobe Steel, Cleveland-Cliffs Inc., Steel Dynamics, Inc., and the State made a commitment in November 2001 for the construction of a pilot plant and subsequent commercial demonstration of Kobe Steel's ITmk3 iron nugget technology. This project has the potential to bring commercial pig iron production to northeastern Minnesota.

Minnesota's aggregate industry produces three types of materials—sand and gravel mined from glacial or alluvial deposits, crushed carbonate from quarries in southeastern Minnesota where natural gravel is scarce, and high-quality crushed rock from quarries in granite, quartzite, or traprock elsewhere in the State.

Aggregate has been or is currently being mined in all of the State's 87 counties. In addition to the production reported by the USGS, some of the same quarries that produce crushed carbonate rock also produce granular carbonate (limestone or dolomite) rock, which is used for soil amendment or for cement. The Minnesota Department of Agriculture (MDA) analyzes the granular carbonate soil amendment commonly called ag-lime to report the neutralization potential. The MDA compilation lists total sales of ag-lime for 2001 as 692,000 metric tons (t) and is available on the Internet at URL http://www.mda.state.mn.us/lime/tonnagestats.pdf. Of that, 411,000 t (59%) was primary production from Minnesota quarries.

On July 17, 2001, the 25th sale of State metallic mineral leases was held in St. Paul. Areas within Aitkin, Lake, and St. Louis Counties were offered in the lease sale that totaled more than 179,000 hectares (ha). During the sale, 10 parties submitted 133 bids on 126 mining units, with 55 mining units bid upon in Lake County and 71 mining units bid upon in St. Louis County. The lease sale resulted in the issuance of 126 metallic mineral leases to eight parties. The leases cover 11,275 ha.

In addition, one company requested and received 17 preference rights leases in 2001, covering 3,014 ha in St. Louis County. Eight negotiated leases were issued to one party for 571 ha in Carlton County, and another party received one negotiated lease covering 65 ha in St. Louis County. There were also eight leases, owned by two parties, that terminated in 2001. The terminated leases covered about 1,390 ha.

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[2] Values, percentage calculations, and rankings for 2000 may differ from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also change.

[3] Maryanna Harstad, Senior Planner, and Paul Purman, Information and Education Specialist, coauthored the text of the State mineral industry information provided by the Minnesota Department of Natural Resources' Division of Lands and Minerals.

The interest in metallic mineral leases for 2001 brought the total active State-issued leases of this type to 267, covering 33,703 ha, as of January 1, 2002. Metallic mineral leases brought in a total of $19,013 for calendar year 2001, of which $12,380 went to the State's School Trust Fund, and $6,633 went to the University Fund.

Lehmann Exploration Management is managing the project at Birch Lake (Babbitt, MN) for the Beaver Bay Joint Venture. This joint venture includes North Central Mining Venture, Powell Production Co., and Conner Management. The Beaver Bay Joint Venture has entered into an agreement with Impala Platinum Holdings Ltd. to explore and evaluate the Birch Lake project for the following mineral commodities: copper, gold, nickel, palladium, platinum, and rhodium. Eight borings were completed in 2001 and are now being evaluated. The deposit lies between 490 meters (m) and 850 m below the surface.

Wallbridge Mining Co. drilled one core hole near the Spruce Road in March 2001. The hole was 700 m deep. It is currently exploring the downhole plunge extension of the Maturi deposit, which could add significantly to the 47 Mt in the current estimate for the Maturi.

A total of 8,179 m of core was drilled in 2001, a slight decrease from the total depth drilled in 2000.

A significant Web-based tool for nonferrous research and exploration in Minnesota was made available in 2001. Public Access to Minerals Information at URL http://minarchive.dnr.state.mn.us provides map and attribute screens for searching more than 12,000 unpublished mineral exploration documents collected during a period of 100 years. These public documents provide a rich source of information for future exploration, environmental research, and historic mineral research. For many areas of the State, they contain the only view of bedrock terrain deeply buried by glacial material.

The documents in the index cover an extremely wide range of information from large regional surveys to data on individual drill holes. Documents may be maps or other drawings and may include text or tabular information on geophysics, geochemistry, or other subjects. Each document has been individually catalogued and, where possible, placed in the context of other related documents from the same exploration program. For each document, cataloging staff noted when the work was done, by whom, where, and the type and method of work.

The Environmental Cooperative Research Program addresses environmental and land-use impacts associated with mining. Typical research projects are cosponsored by industry, Federal agencies, and other units of Government on a cost-share or in-kind service basis. Projects undertaken in 2001 include characterization and modeling of acid rock drainage, dissolution of greenstones, mercury volatization in taconite tailings, mercury removal from induration off gas by wet scrubbers, dissolution of individual silicate minerals of the Duluth Complex, and use of biosolids to reclaim coarse taconite tailings. Biennial appropriation (July 2001 to June 2003) for minerals cooperative environmental research is $100,000 in the first fiscal year and $101,000 in the second. Only a portion ($50,000 and $50,500) is available if matching non-State funds are not provided.

The Minerals Diversification Program funds research supporting the long-term health of the State's mining economy. This is achieved through improvements to existing industry and by encouraging environmentally sound exploration and development of new mineral resources. Biennial appropriation (July 2001 to June 2003) for minerals diversification is $370,000 in the first fiscal year and $372,000 in the second. Current (2001) research includes delineation of potential platinum-group metal mineral resources, mapping of county aggregate resources, mercury investigations, and evaluation of known but undeveloped resources, such as copper and nickel.

The Iron Ore Cooperative Research Program funds research supporting rapid improvements in iron ore/taconite processing. Biennial appropriation (July 2001 to June 2003) is $307,000 in the first fiscal year and $273,000 in the second. Only $200,000 each year is available if Federal matching funds are not provided. Current research includes borehole geophysical investigations supporting improved ore blending, magnetic studies that may lead to reduced need for flotation chemicals in final stage processing, and online chemical analysis that may lead to increased taconite pellet quality and processing efficiency through better information on iron, silica, calcium, and magnesium in taconite ore.

In the 2001 session, the Minnesota Legislature created two taconite mining grant programs to fund industry improvements. A factsheet with more information on these programs is available on the DLM's publication page at URL http://www.dnr.state.mn.us.

Other legislative action amended the statute relating to the aggregate material tax by making some borrow material taxable, by specifying how additional counties could become eligible to collect the tax, and by allowing counties to impose a lower tax rate than previously permitted. Local governments in the Twin Cities metropolitan area now must consider aggregate resources when conducting land-use plans.

In addition to the Public Access to Minerals Information site described earlier, the following information is available on the DNR Web site at URL http://www.dnr.state.mn.us: monthly data releases, information on mineral lease availability, aggregate resource maps for seven counties, a seven-county Minneapolis-St. Paul metropolitan area aggregate resource map, and many online documents pertaining to mineral and mining research and exploration.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN MINNESOTA 1/ 2/

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral	1999 Quantity	1999 Value	2000 Quantity	2000 Value	2001 p/ Quantity	2001 p/ Value
Clays, common	W	W	14	15	14	15
Gemstones	NA	6	NA	6	NA	6
Iron ore, usable	43,800 r/	1,150,000	46,700	1,180,000	45,900	1,160,000
Peat	W	W	75	5,100	70	3,850
Sand and gravel, construction	37,300	142,000	39,500	158,000	35,500	144,000
Stone:						
Crushed	13,100 r/	62,700 r/	12,400	68,100	15,000	85,000
Dimension metric tons	42,700	20,700	W	W	W	W
Combined values of lime, sand and gravel (industrial), stone [dimension granite and limestone (2000-01)], and values indicated by symbol W	XX	35,200	XX	44,100	XX	43,300
Total	XX	1,410,000 r/	XX	1,460,000	XX	1,440,000

p/ Preliminary. r/ Revised. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined values" data. XX Not applicable.

1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/ Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 2
MINNESOTA: CRUSHED STONE SOLD OR USED, BY KIND 1/

Kind	1999 Number of quarries	1999 Quantity (thousand metric tons)	1999 Value (thousands)	1999 Unit value	2000 Number of quarries	2000 Quantity (thousand metric tons)	2000 Value (thousands)	2000 Unit value
Limestone	49	7,050	$28,600	$4.05	49	6,400	$30,300	$4.73
Granite	4	W	W	W	4	W	W	6.43
Dolomite	7	3,300	20,500	6.19	8	3,370	20,400	6.06
Quartzite	1 r/	W	W	W	1	W	W	9.60
Total or average	XX	13,100 r/	62,700 r/	4.80 r/	XX	12,400	68,100	5.50

r/ Revised. W Withheld to avoid disclosing company proprietary data; included in "Total." XX Not applicable.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 3
MINNESOTA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+1 1/2 inch):			
Macadam	W	W	$5.00
Riprap and jetty stone	68	$768	11.29
Filter stone	W	W	3.20
Other coarse aggregate	41	674	16.44
Coarse aggregate, graded:			
Concrete aggregate, coarse	581	3,890	6.70
Bituminous aggregate, coarse	411	2,740	6.67
Bituminous surface-treatment aggregate	W	W	8.03
Railroad ballast	W	W	7.35
Other graded coarse aggregate	928	6,780	7.31
Fine aggregate (-3/8 inch):			
Stone sand, concrete	W	W	6.55
Stone sand, bituminous mix or seal	W	W	6.41
Screening, undesignated	W	W	3.63
Other fine aggregate	110	675	6.14
Coarse and fine aggregates:			
Graded road base or subbase	1,030	5,570	5.42
Unpaved road surfacing	505	1,830	3.62
Terrazzo and exposed aggregate	W	W	11.90
Crusher run or fill or waste	68	358	5.26
Roofing granules	W	W	6.07
Other coarse and fine aggregates	1,130	6,000	5.27
Agricultural:			
Agricultural limestone	313	1,630	5.21
Poultry grit and mineral food	W	W	33.50
Unspecified: 3/			
Reported	4,210	20,200	4.80
Estimated	1,900	9,200	4.85
Total or average	12,400	68,100	5.50

W Withheld to avoid disclosing company proprietary data; included in "Total."

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Includes dolomite, granite, limestone, and quartzite.

3/ Reported and estimated production without a breakdown by end use.

TABLE 4
MINNESOTA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE AND DISTRICT 1/ 2/ 3/

(Thousand metric tons and thousand dollars)

	District 2		District 3		District 4		District 5		District 6	
Use	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Construction:										
Coarse aggregate (+1 1/2 inch) 4/	--	--	--	--	W	W	89	1,260	W	W
Coarse aggregate, graded 5/	--	--	W	W	W	W	928	6,780	W	W
Fine aggregate (-3/8 inch) 6/	--	--	W	W	W	W	W	W	W	W
Coarse and fine aggregate 7/	--	--	W	W	W	W	1,920	10,300	565	2,000
Agricultural 8/	--	--	--	--	W	W	W	W	W	W
Unspecified: 9/										
Reported	--	--	--	--	382	1,810	1,470	6,960	2,360	11,500
Estimated	6	29	300	1,400	860	4,200	36	180	700	3,400
Total	6	29	1,750	11,300	2,030	11,700	4,780	27,500	3,810	17,500

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes dolomite, granite, limestone, and quartzite.

3/ No production reported in District 1.

4/ Includes filter stone, macadam, riprap and jetty stone, and other coarse aggregate.

5/ Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), railroad ballast, and other graded coarse aggregate.

6/ Includes screening (undesignated), stone sand (bituminous mix or seal), stone sand (concrete), and other fine aggregate.

7/ Includes crusher run (select material or fill), graded road base or subbase, roofing granules, terrazzo and exposed aggregate, unpaved road surfacing and other surfacing, and other coarse and fine aggregates.

8/ Includes agricultural limestone and poultry grit and mineral food.

9/ Reported and estimated production without a breakdown by end use.

TABLE 5
MINNESOTA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	10,900	$58,500	$5.39
Plaster and gunite sands	208	1,220	5.88
Concrete products (blocks, bricks, pipe, decorative, etc.)	363	2,470	6.79
Asphaltic concrete aggregates and other bituminous mixtures	4,690	21,300	4.53
Road base and coverings 2/	9,300	30,600	3.29
Fill	3,220	6,010	1.87
Snow and ice control	552	1,910	3.45
Other miscellaneous uses 3/	332	1,380	4.14
Unspecified: 4/			
Reported	2,380	7,900	3.32
Estimated	7,600	27,000	3.55
Total or average	39,500	158,000	4.00

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes road and other stabilization (cement and lime).

3/ Includes filtration and roofing granules.

4/ Reported and estimated production without a breakdown by end use.

TABLE 6
MINNESOTA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate (including concrete sand)	1,170	6,590	533	2,900	3,760	15,400
Plaster and gunite sands	--	--	114	747	W	W
Concrete products (blocks, bricks, pipe, decorative, etc.)	W	W	13	55	W	W
Asphaltic concrete aggregates and other bituminous mixtures	313	918	W	W	3,360	13,800
Road base and coverings 2/	1,180	2,700	1,060	3,750	5,230	17,600
Fill	W	W	168	455	173	438
Snow and ice control	--	--	W	W	39	162
Other miscellaneous uses 3/	385	863	650	1,850	429	1,620
Unspecified: 4/						
Reported	288	503	664	1,550	1	13
Estimated	1,600	4,900	1,800	6,000	730	2,400
Total	4,970	16,400	4,980	17,300	13,700	51,500
	District 4		Districts 5		District 6	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate (including concrete sand)	468	2,020	4,180	27,200	672	4,210
Plaster and gunite sands	17	80	W	W	W	W
Concrete products (blocks, bricks, pipe, decorative, etc.)	W	W	W	W	--	--
Asphaltic concrete aggregates and other bituminous mixtures	435	3,940	W	W	--	--
Road base and coverings 2/	W	W	659	3,520	W	W
Fill	W	W	2,200	3,160	165	696
Snow and ice control	42	129	W	W	35	87
Other miscellaneous uses 3/	928	2,860	650	4,600	157	363
Unspecified: 4/						
Reported	8	77	654	2,760	767	3,000
Estimated	1,800	7,800	880	3,000	820	3,000
Total	3,670	16,900	9,220	44,200	2,610	11,300
	Unspecified districts					
	Quantity	Value				
Concrete aggregate (including concrete sand)	83	183				
Plaster and gunite sands	--	--				
Concrete products (blocks, bricks, pipe, decorative, etc.)	--	--				
Asphaltic concrete aggregates and other bituminous mixtures	--	--				
Road base and coverings 2/	263	435				
Fill	--	--				
Snow and ice control	--	--				
Other miscellaneous uses 3/	--	--				
Unspecified: 4/						
Reported	--	--				
Estimated	--	--				
Total	346	618				

W Withheld to avoid disclosing company proprietary data; included with "Other miscellaneous uses." -- Zero.

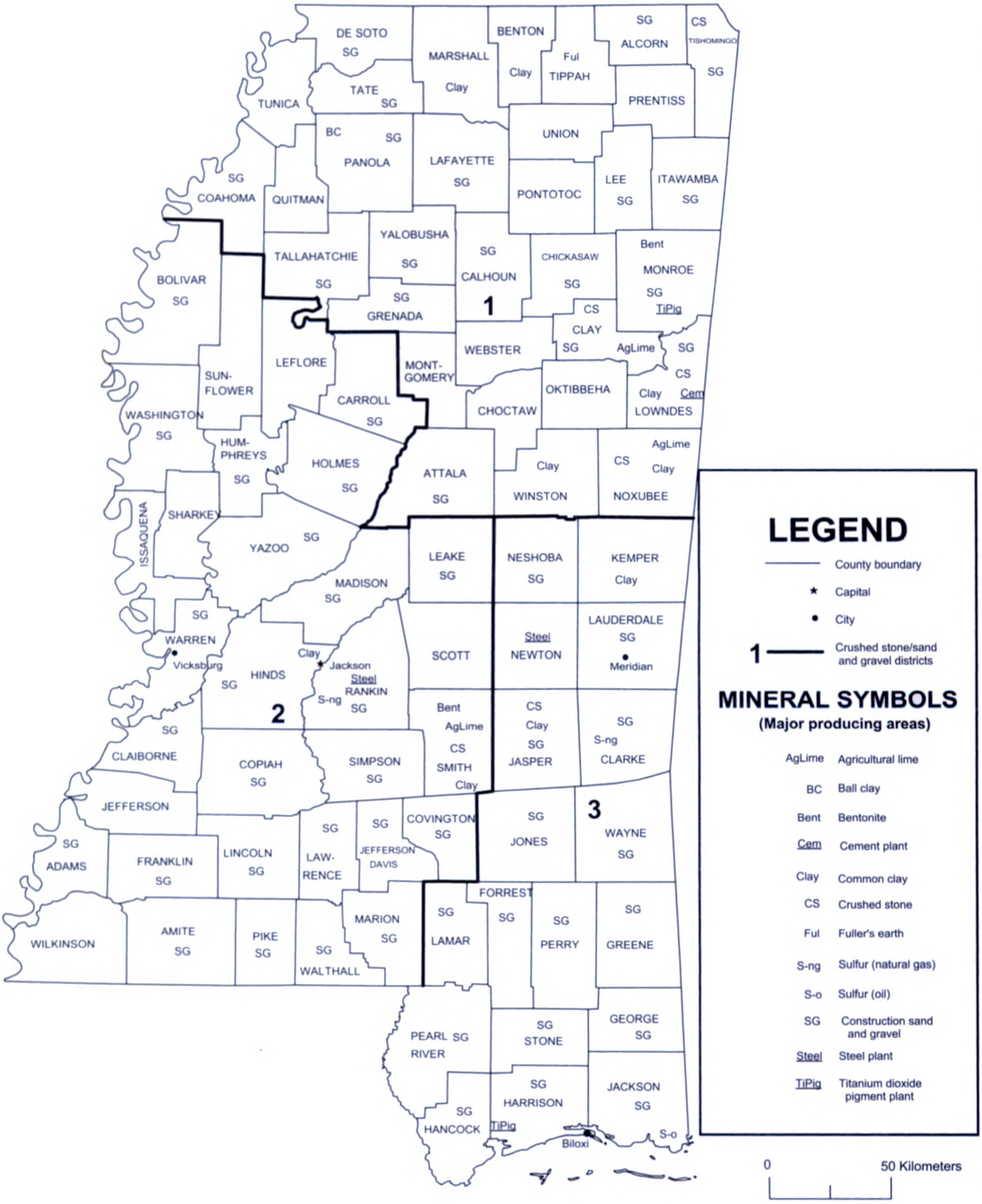
1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes road and other stabilization (cement and lime).

3/ Includes filtration and roofing granules.

4/ Reported and estimated production without a breakdown by end use.

MISSISSIPPI



Source: Mississippi Department of Environmental Quality, Office of Geology/U.S. Geological Survey (2001)

THE MINERAL INDUSTRY OF MISSISSIPPI

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Mississippi Department of Environmental Quality, Office of Geology, for collecting information on all nonfuel minerals.

In 2001, the estimated value[1] of nonfuel mineral production for Mississippi was $177 million, based upon preliminary U.S. Geological Survey (USGS) data. This was a 19% increase from that of 2000,[2] and followed a 6.9% decrease in 2000 from that of 1999.

Construction sand and gravel was Mississippi's leading nonfuel mineral, accounting for about 37% of the State's total nonfuel mineral value in 2001. It was followed by crushed stone, portland cement, fuller's earth, and industrial sand and gravel. The State's major construction materials—construction sand and gravel, portland cement, and crushed stone (including crushed marl)—accounted for about 70% of Mississippi's total value. In 2001, the nonfuel mineral with the largest increase was construction sand and gravel, up more than $23 million. In 2000, increases in crushed stone and industrial sand and gravel of $7.8 million and $6 million, respectively, were not enough to offset decreases of $17 million in construction sand and gravel and about $8 million in portland cement, resulting in the overall decrease for the year. All other changes were about $1 million or less, having little effect on the net result (table 1).

Based upon USGS estimates of the quantities of minerals produced in the 50 States during 2001, Mississippi remained second in fuller's earth, increased to third from fourth in bentonite, and continued to be fourth of four ball-clay-producing States. Additionally, the State was a significant producer of industrial sand and gravel and common clays. Metals produced in Mississippi, especially raw steel, were processed from materials received from other domestic and foreign sources.

The following narrative information was provided by the Mississippi Department of Environmental Quality's (DEQ) Office of Geology[3] (MOG). The Mississippi Commission on Environmental Quality issued 42 surface mining permits covering approximately 400 hectares (ha) and processed 91 Notices of Exempt Operations [1.6 ha (4 acres) or less] covering approximately 140 ha. Under State law, surface mines of 1.6 ha or less were required neither to obtain a mining permit nor to perform reclamation of any kind. The MOG's Mining and Reclamation Division (MRD) performed 839 annual inspections for all active mining permits on file and received applications for bond release on 121 permits. During the year, 400 ha were reclaimed and released.

The U.S. Department of Labor's Mine Safety and Health Administration (MSHA) by regulation (Parts 46 and 48) required annual miner safety training. In part, all operations that process material in some way, such as rock crushing or washing operations, were required to have detailed safety plans in place at mines or mineral processing sites, and all personnel were required to train in the execution of such plans. The MRD employed a contractor to perform the training throughout the entire State and helped oversee the training. This trainer was paid in part by a grant from MSHA.

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[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2001 USGS mineral production data published in this chapter are preliminary estimates as of August 2002 and are expected to change. For some mineral commodities, such as construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Specialist contact information may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals/contacts/comdir.html; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2] Values, percentage calculations, and rankings for 2000 may differ from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also change.

[3] Ken McCarley, Director of the Mining and Reclamation Division of the Mississippi Department of Environmental Quality's Office of Geology, authored the text of the State mineral industry information provided by that agency.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN MISSISSIPPI 1/ 2/

(Thousand metric tons and thousand dollars)

Mineral	1999		2000		2001 p/	
	Quantity	Value	Quantity	Value	Quantity	Value
Clays:						
Common	497	3,390	484	2,200	484	2,190
Fuller's earth	377	29,400	371	30,100	369	22,900
Gemstones	NA	1	NA	1	NA	1
Sand and gravel, construction	12,100	58,900	11,700	60,900	12,400	65,600
Stone, crushed 3/	1,760	15,900	2,530	23,700	3,300	31,800
Combined values of cement (portland), clays (ball, bentonite), sand and gravel (industrial), stone (crushed marl)	XX	52,300	XX	51,700	XX	54,000
Total	XX	160,000	XX	149,000	XX	177,000

p/ Preliminary. NA Not available. XX Not applicable.

1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/ Data are rounded to no more than three significant digits; may not add to totals shown.

3/ Excludes certain stones; kind and value included with "Combined values" data.

TABLE 2
MISSISSIPPI: CRUSHED STONE SOLD OR USED, BY KIND 1/

Kind	1999				2000			
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone	10	1,760	$15,900	$9.00	5	2,530	$23,700	$9.37
Calcareous marl	1	W	W	W	1	W	W	W
Total or average	XX	1,760	15,900	9.00	XX	2,530	23,700	9.37

W Withheld to avoid disclosing company proprietary data. XX Not applicable.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 3
MISSISSIPPI: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+1 1/2 inch), other coarse aggregate	W	W	$13.43
Coarse aggregate, graded, other graded coarse aggregate	W	W	10.58
Fine aggregate (-3/8 inch), other fine aggregate	W	W	14.69
Coarse and fine aggregates, other coarse and fine aggregates	W	W	13.01
Agricultural limestone	W	W	15.90
Chemical and metallurgical, cement manufacture	W	W	3.86
Unspecified: 3/			
Reported	363	$3,200	8.82
Estimated	30	270	9.07
Total or average	2,530	23,700	9.37

W Withheld to avoid disclosing company proprietary data; included in "Total."

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Includes limestone; excludes calcareous marl to avoid disclosing company proprietary data.

3/ Reported and estimated production without a breakdown by end use.

TABLE 4
MISSISSIPPI: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE AND DISTRICT 1/ 2/

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3		Unspecified districts	
Use	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Construction:								
Coarse aggregate (+1 1/2 inch) 3/	W	W	W	W	W	W	W	W
Coarse aggregate, graded 4/	W	W	W	W	W	W	W	W
Fine aggregate (-3/8 inch) 5/	W	W	W	W	W	W	--	--
Coarse and fine aggregate 6/	W	W	W	W	W	W	W	W
Agricultural 7/	W	W	W	W	--	--	--	--
Chemical and metallurgical 8/	W	W	--	--	--	--	--	--
Unspecified: 9/								
Reported	--	--	127	1,120	236	2,080	--	--
Estimated	12	100	19	170	--	--	--	--
Total	1,240	10,400	391	4,970	474	5,850	424	2,550

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes limestone; excludes calcareous marl to avoid disclosing company proprietary data.

3/ Includes other coarse aggregate.

4/ Includes other graded coarse aggregate.

5/ Includes other fine aggregate.

6/ Includes other coarse and fine aggregate.

7/ Includes agricultural limestone.

8/ Includes cement manufacture.

9/ Reported and estimated production without a breakdown by end use.

TABLE 5
MISSISSIPPI: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	3,290	$19,500	$5.93
Plaster and gunite sands	29	204	7.03
Concrete products (blocks, bricks, pipe, decorative, etc.)	93	611	6.57
Asphaltic concrete aggregates and other bituminous mixtures	2,620	15,400	5.88
Road base and coverings	1,050	3,960	3.79
Fill	387	683	1.76
Other miscellaneous uses	86	773	8.99
Unspecified: 2/			
Reported	1,020	4,160	4.07
Estimated	3,100	16,000	5.02
Total or average	11,700	60,900	5.21

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Reported and estimated production without a breakdown by end use.

TABLE 6
MISSISSIPPI: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3		Unspecified districts	
Use	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products 2/	1,490	8,850	W	W	W	W	92	490
Asphaltic concrete aggregates and other bituminous mixtures	1,660	10,100	892	5,150	--	--	70	154
Road base and covering	726	2,680	W	W	W	W	45	188
Fill	235	444	34	107	91	101	27	32
Other miscellaneous uses	--	--	2,040	12,300	492	2,170	--	--
Unspecified: 3/								
Reported	680	2,550	W	W	W	W	--	--
Estimated	470	2,300	1,500	7,500	1,200	5,800	--	--
Total	5,260	27,000	4,450	25,000	1,740	8,030	235	864

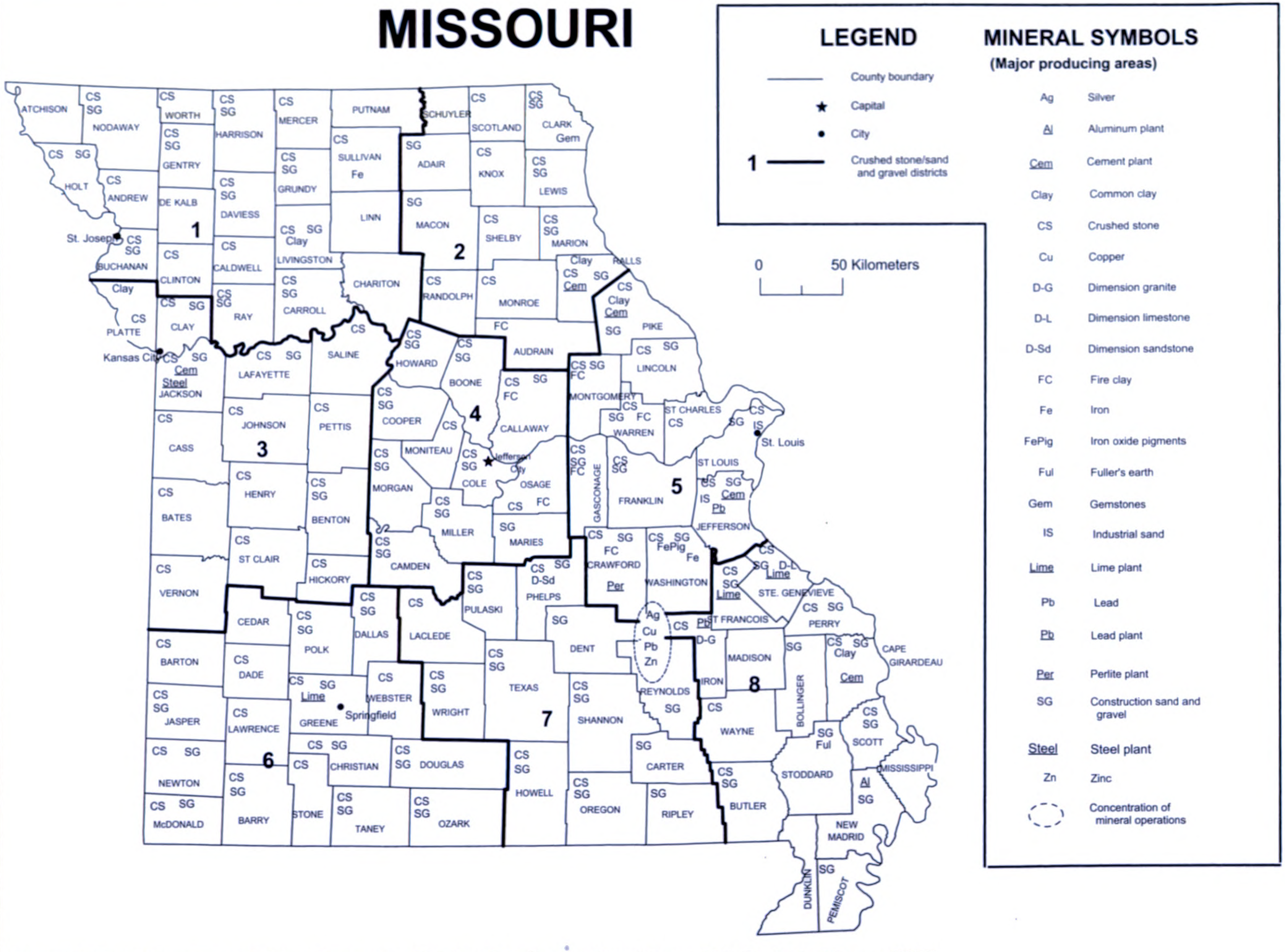
W Withheld to avoid disclosing company proprietary data; included with "Other miscellaneous uses." -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes plaster and gunite sands.

3/ Reported and estimated production without a breakdown by end use.

MISSOURI



Source: Missouri Department of Natural Resources, Division of Geology and Land Survey/U.S. Geological Survey (2001)

THE MINERAL INDUSTRY OF MISSOURI

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Missouri Department of Natural Resources, Division of Geology and Land Survey, for collecting information on all nonfuel minerals.

In 2001, the estimated value[1] of nonfuel mineral production for Missouri was $1.34 billion, based upon preliminary U.S. Geological Survey (USGS) data. This remained unchanged from 1999 and 2000.[2] The State remained 10th in rank among the 50 States in total nonfuel mineral production value, of which Missouri accounted for nearly 3.5% of the U.S. total.

Crushed stone, cement (portland and masonry), lead, and lime, in descending order of value, accounted for about 88% of Missouri's total nonfuel mineral production value in 2001. Missouri continued to be the top lead-producing State in the Nation, producing significantly more than one-half the Nation's output and about 2 times and 15 times as much lead as that of the two next highest producing States, respectively. However, both crushed stone and portland cement, by value, remained the State's leading nonfuel minerals in 2001, having surpassed lead in 1997 and 1999, respectively. Prior to this, lead had been Missouri's leading nonfuel mineral since 1969, except for several years in the mid-1980s and during 1993-95 (crushed stone was first).

In 2000, the State's increased values of crushed stone, up $53 million; portland cement, up $18 million; and zinc, up about $5 million, were offset by significant decreases in other nonfuel minerals, mostly those of lead, down more than $50 million; iron ore (proprietary data); lime, down about $10 million; and construction sand and gravel, down more than $8 million. All other changes in value in 2000 were small relative to these (table 1).

Based upon USGS preliminary estimates of the quantities produced in the 50 States in 2001, Missouri remained first in lime and fire clay, second in iron oxide pigments, third in zinc, fifth in portland cement, and ninth in gemstones (in descending order of value). The State rose to third from fourth in the production of fuller's earth and dropped from sixth to seventh in common clays. Additionally, Missouri is one of the Nation's leading producers of crushed stone as well as a significant producer of construction and industrial sand and gravel, masonry cement, and silver.

The Missouri Department of Natural Resources, Division of Geology and Land Survey[3] (DGLS), provided the following narrative information. Some data or information as reported by the DGLS may differ from USGS preliminary estimates and production figures as reported to and estimated by the USGS. Pea Ridge Iron Ore Co. closed its Pea Ridge Mine in northwest Washington County in early September 2001. The Pea Ridge Mine produced magnetite for use as heavy-media flotation, for ceramics, and for other uses. This closure represents the first time in approximately 190 years that the State will not have an active iron mining industry. The mining of iron in Missouri began in about 1815 from small deposits of magnetite on Shepherd Mountain, near Ironton in Iron County. The Pea Ridge property has been purchased for a commercial hunting preserve.

The lead industry in Missouri continued to struggle because of low priced imports of concentrates from China. The Doe Run Co. stopped underground exploration at its Higdon prospect in Perry and St. Francois Counties. The exploration program was designed to obtain material for metallurgical testing purposes and mine development planning. Viburnum No. 29 and West Fork mines and flotation mills continued on standby because of economic conditions.

The crushed stone markets in northeast Missouri have been very active for the past 8 years. During 2001, there was a slight increase from that of 2000, but the DGLS anticipated that business might decrease for many northeast operations in 2002.

The limestone aggregate market in northwest Missouri experienced moderate to slightly decreasing activity in 2001, with continued decreases expected in 2002. Most of this is related to the decreasing number of Missouri Department of Transportation (MoDOT) construction contracts. Hunt Midwest started construction of a 460-meter (m)-long decline at its Stamper Quarry. Completion is expected in midyear 2002. The decline will have a vertical depth of 76 m and will access stone resources in the Bethany Falls Limestone. Initially, haulage will be by truck, but eventually the primary crusher will be underground, and the stone will be conveyed to the surface for further processing.

Overall, in 2001, there was considerable activity in the construction-related crushed stone markets in Missouri. Commercial markets were especially busy in some areas, while the housing market was similarly active. Infrastructure work was decreasing (in particular MoDOT work) and was expected to continue as such in 2002.

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[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2001 USGS mineral production data published in this chapter are preliminary estimates as of August 2002 and are expected to change. For some mineral commodities, such as construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Specialist contact information may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals/contacts/comdir.html; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2] Values, percentage calculations, and rankings for 2000 may differ from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also change.

[3] Ardel Rueff, Geologist, authored the text of the State mineral industry information provided by the Division of Geology and Land Survey.

Springfield Underground Inc. in Greene County started the construction of a new facility to replace a late 1960s plant. A new primary crusher is being installed underground to shorten haul distances and open additional underground space for development. The surface plant will have a capacity of 540 metric tons per hour and is completely enclosed except for loading and transfer points. The plant will produce a variety of aggregate sizes but is optimized to produce concrete stone, manufactured limestone, concrete, sand, and high-grade agricultural lime.

The crushed stone market in the St. Louis area remained very active in 2001, although sales were down slightly from the record high of 2000. The DGLS outlook was for increased sales in 2002 owing to ongoing infrastucture work related to the airport and highways; a continued demand for stone at or near current rates is expected for the next 5 years. Central Stone Co. purchased Bellefontaine Quarries from Berra Construction Co. in November 2001. The purchase included Bellefontaine North in Bellefontaine, St. Louis County; Bellefontaine South in Antonio, Jefferson County; Lincoln County Stone in Moscow Mills, Lincoln County; and St. Francois Stone in Farmington, St. Francois County.

Aggregate markets in southeast Missouri were similar to the active markets in northeast Missouri, 2001 also being slightly busier than 2000. The outlook for 2002 was optimistic because a considerable amount of work was already under contract (although projects had been somewhat slowed down by a rainy spring).

Delta Companies acquired Brown Sand & Gravel at Caruthersville, Pemiscot County. Included in the acquisition were a dredge operation and barge loading and unloading facilities. Several operators expressed concern about the future of funding for highways and bridges.

Housing and commercial projects kept ready-mix concrete markets busy, but market share has been reduced because of the limited use of sand in "superpave." Superpave is a new more stringent asphalt aggregate specification. Environmental and wetland issues continue to be an issue in many areas and streams. A decision by the U.S. Army Corps of Engineers on future management practices for the Missouri River, expected in early 2002, may affect dredge operations. This impact could be significant if a spring flood is mandated to mimic the natural seasonal flow of the river.

During 2001, the Missouri refractory clay industry experienced reduced production and some shifts in the uses of the raw materials produced. RHI continued to consolidate production at its brick plants following the acquisition of Harbison-Walker and A.P. Green. These consolidations included plant closings and large staff reductions in management and hourly workers. Major reasons given for the market condition is low domestic steel production and improved products. More Missouri refractory clay is being used for cement production than is being used in traditional refractory markets.

At yearend 2001, Nestle purchased Ralston Purina Co., which included the operations of a bentonitic clay mine and processing plant near Bloomfield, Scott County. The new name for the facility is the Nestle Purina PetCare Co., Golden Products Division. The Bloomfield plant makes absorbents for pet care and industrial uses.

In the cement industry, Lafarge Corp.'s North American Division commissioned the underground Sugar Creek Mine to provide raw materials for the company's cement plant near Kansas City, Jackson County, in March 2001. Lafarge acquired the Missouri Portland Cement Co. in 1991 and, in October of 1996, decided to build a new plant at the site and to develop an underground mine to supply stone. The mine was developed in the St. Louis Limestone at a depth of 200 m below the plant level. The mine is serviced by two shafts—a production shaft 4 m in diameter and a service shaft 5 m in diameter. Mining is by room-and-pillar methods, and all crushing is underground. The planned capacity of the mine is 1.2 million metric tons per year (Mt/yr). The new cement manufacturing plant is scheduled for completion in the near future.

Holcim (US) Inc. continued the permitting process for its planned Lee Island cement plant in Ste. Genevieve County. Opposition to construction has been expressed by numerous environmental groups. The company completed a road into the property to permit easier access and for use in plant construction. The planned facility would have a 4-Mt/yr capacity. It would be a single kiln, dry process operation with coal planned as the primary fuel. The company controls in excess of 1,620 hectares at the site.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN MISSOURI 1/ 2/

(Thousand metric tons and thousand dollars)

Mineral	1999		2000		2001 p/	
	Quantity	Value	Quantity	Value	Quantity	Value
Cement, portland	4,910	354,000 e/	4,880	372,000 e/	5,000 e/	381,000 e/
Clays:						
Common	1,080	4,180	1,050	3,240	1,050	3,240
Fire	293	3,980	351	4,630	270	3,500
Sand and gravel, construction	12,400	50,300	10,700	41,700	11,500	45,400
Stone, crushed	72,600 r/	346,000 r/	75,500	399,000	75,300	410,000
Combined values of cement (masonry), clay (fuller's earth), copper, gemstones, iron ore [usable(1999)], iron oxide pigments (crude), lead, lime, sand and gravel (industrial), silver, stone (dimension granite), zinc, and values indicated by symbol W	XX	585,000 r/	XX	516,000 r/	XX	500,000
Total	XX	1,340,000 r/	XX	1,340,000 r/	XX	1,340,000

e/ Estimated. p/ Preliminary. r/ Revised. XX Not applicable.

1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/ Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 2
MISSOURI: CRUSHED STONE SOLD OR USED, BY KIND 1/

Kind	1999				2000			
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone 2/	176 r/	66,000 r/	$313,000 r/	$4.74 r/	179	70,200	$337,000	$4.79
Dolomite	23 r/	4,630 r/	21,800 r/	4.71	24	3,880	18,700	4.82
Granite	2	W	W	W	2	W	W	W
Traprock	2	W	W	W	2	W	W	W
Total or average	XX	72,600 r/	346,000 r/	4.77 r/	XX	75,500	399,000	5.28

r/ Revised. W Withheld to avoid disclosing company proprietary data; included in "Total." XX Not applicable.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes limestone-dolomite reported with no distinction between the two.

TABLE 3
MISSOURI: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+1 1/2 inch):			
Macadam	339	$1,840	$5.42
Riprap and jetty stone	2,880	13,700	4.76
Filter stone	172	836	4.86
Other coarse aggregate	1,470	7,120	4.85
Total or average	4,860	23,500	4.84
Coarse aggregate, graded:			
Concrete aggregate, coarse	2,080	13,000	6.25
Bituminous aggregate, coarse	1,110	6,270	5.66
Bituminous surface-treatment aggregate	914	5,640	6.17
Railroad ballast	886	4,140	4.67
Other graded coarse aggregate	3,650	22,700	6.23
Total or average	8,640	51,800	5.99
Fine aggregate (-3/8 inch):			
Stone sand, concrete	227	1,380	6.06
Stone sand, bituminous mix or seal	278	1,850	6.67
Screening, undesignated	482	2,720	5.65
Other fine aggregate	1,370	6,350	4.65
Total or average	2,350	12,300	5.23
Coarse and fine aggregates:			
Graded road base or subbase	5,800	27,400	4.73
Unpaved road surfacing	1,220	5,720	4.34
Crusher run or fill or waste	187	774	4.14
Roofing granules	W	W	W
Other coarse and fine aggregates	4,590	56,900	12.40
Total or average	11,800	90,400	7.67
Other construction materials	346	2,040	5.89
Agricultural:			
Agricultural limestone	854	3,760	4.40
Poultry grit and mineral food	W	W	3.54
Other agricultural uses	138	491	3.56
Total or average	992	4,250	4.28
Chemical and metallurgical:			
Cement manufacture	4,360	14,300	3.28
Lime manufacture	1,600	7,290	4.57
Flux stone	(3/)	(3/)	5.70
Chemical stone	(3/)	(3/)	5.19
Special, asphalt fillers or extenders	(3/)	(3/)	4.80
Unspecified: 4/			
Reported	15,900	75,900	4.76
Estimated	24,000	120,000	4.74
Total or average	40,200	191,000	4.75
Grand total or average	75,500	399,000	5.28

W Withheld to avoid disclosing company proprietary data; included with "Other."

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Includes dolomite, granite, limestone, limestone-dolomite, and traprock.

3/ Withheld to avoid disclosing company proprietary data; included in "Grand total."

4/ Reported and estimated production without a breakdown by end use.

TABLE 4
MISSOURI: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3		District 4		District 5		District 6		District 7		District 8	
Use	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Construction:																
Coarse aggregate (+1 1/2 inch) 2/	53	231	W	W	W	W	231	1,060	1,400	7,630	120	804	W	W	2,580	12,000
Coarse aggregate, graded 3/	W	W	W	W	1,020	5,180	1,110	7,200	2,720	18,400	1,620	10,100	533	2,950	1,530	7,480
Fine aggregate (-3/8 inch) 4/	W	W	W	W	W	W	W	W	1,320	5,960	W	W	W	W	162	806
Coarse and fine aggregate 5/	338	1,390	W	W	W	W	912	3,960	3,740	17,000	1,500	7,520	415	2,010	4,080	55,000
Other construction materials	137	678	--	--	--	--	--	--	--	--	115	737	17	87	76	535
Agricultural 6/	55	186	W	W	122	493	W	W	W	W	270	1,210	63	314	331	1,550
Chemical and metallurgical 7/	--	--	W	W	W	W	--	--	W	W	W	W	--	--	W	W
Special 8/	--	--	--	--	--	--	--	--	--	--	--	--	--	--	W	W
Unspecified: 9/																
Reported	3,210	15,100	164	770	4,480	21,100	506	2,400	5,180	24,400	1,500	7,860	--	--	908	4,280
Estimated	1,800	8,400	2,900	14,000	3,300	16,000	1,200	5,900	5,100	24,100	4,700	22,300	620	2,900	4,700	22,000
Total	5,670	26,400	4,670	20,700	10,200	48,100	4,060	20,900	20,900	101,000	10,600	55,400	1,690	8,480	17,800	18,000

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes filter stone, macadam, riprap and jetty stone, and other coarse aggregate.

3/ Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), railroad ballast, and other graded coarse aggregate.

4/ Includes screening (undesignated), stone sand (concrete), stone sand (bituminous mix or seal), and other fine aggregate.

5/ Includes crusher run (select material or fill), graded road base or subbase, roofing granules, unpaved road surfacing, and other coarse and fine aggregates.

6/ Includes agricultural limestone, poultry grit and mineral food, and other agricultural uses.

7/ Includes cement manufacture, chemical stone for alkali works, flux stone, and lime manufacture.

8/ Includes asphalt fillers or extenders.

9/ Reported and estimated production without a breakdown by end use.

TABLE 5
MISSOURI: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand) 2/	5,670	$22,000	$3.88
Concrete products (blocks, bricks, pipe, decorative, etc.)	596	2,270	3.82
Asphaltic concrete aggregates and other bituminous mixtures	407	1,200	2.94
Road base and coverings	202	885	4.38
Fill	345	770	2.23
Snow and ice control	42	194	4.62
Other miscellaneous uses 3/	106	917	8.65
Unspecified: 4/			
Reported	667	3,020	4.53
Estimated	2,700	10,000	3.86
Total or average	10,700	41,700	3.89

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes plaster and gunite sands.

3/ Includes filtration and roofing granules.

4/ Reported and estimated production without a breakdown by end use.

TABLE 6
MISSOURI: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3		District 4	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products 2/	66	386	--	--	--	--	W	W
Asphaltic concrete aggregates and road base materials	W	W	--	--	--	--	151	629
Fill	18	46	--	--	--	--	67	236
Other miscellaneous uses 3/	7	39	--	--	--	--	1,160	4,950
Unspecified: 4/								
Reported	--	--	28	171	361	1,480	172	828
Estimated	430	1,600	180	820	10	44	99	380
Total	516	2,020	205	995	371	1,520	1,650	7,020

Use	District 5		District 6 and 7		District 8	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products 2/	4,100	14,600	242	1,160	W	W
Asphaltic concrete aggregates and road base materials	385	1,190	59	184	W	W
Fill	220	331	39	156	--	--
Other miscellaneous uses 3/	90	762	28	232	733	3,330
Unspecified: 4/						
Reported	--	--	106	545	--	--
Estimated	1,200	5,000	480	1,800	340	840
Total	5,980	22,000	954	4,060	1,070	4,170

W Withheld to avoid disclosing company proprietary data; included with "Other miscellaneous uses." -- Zero.

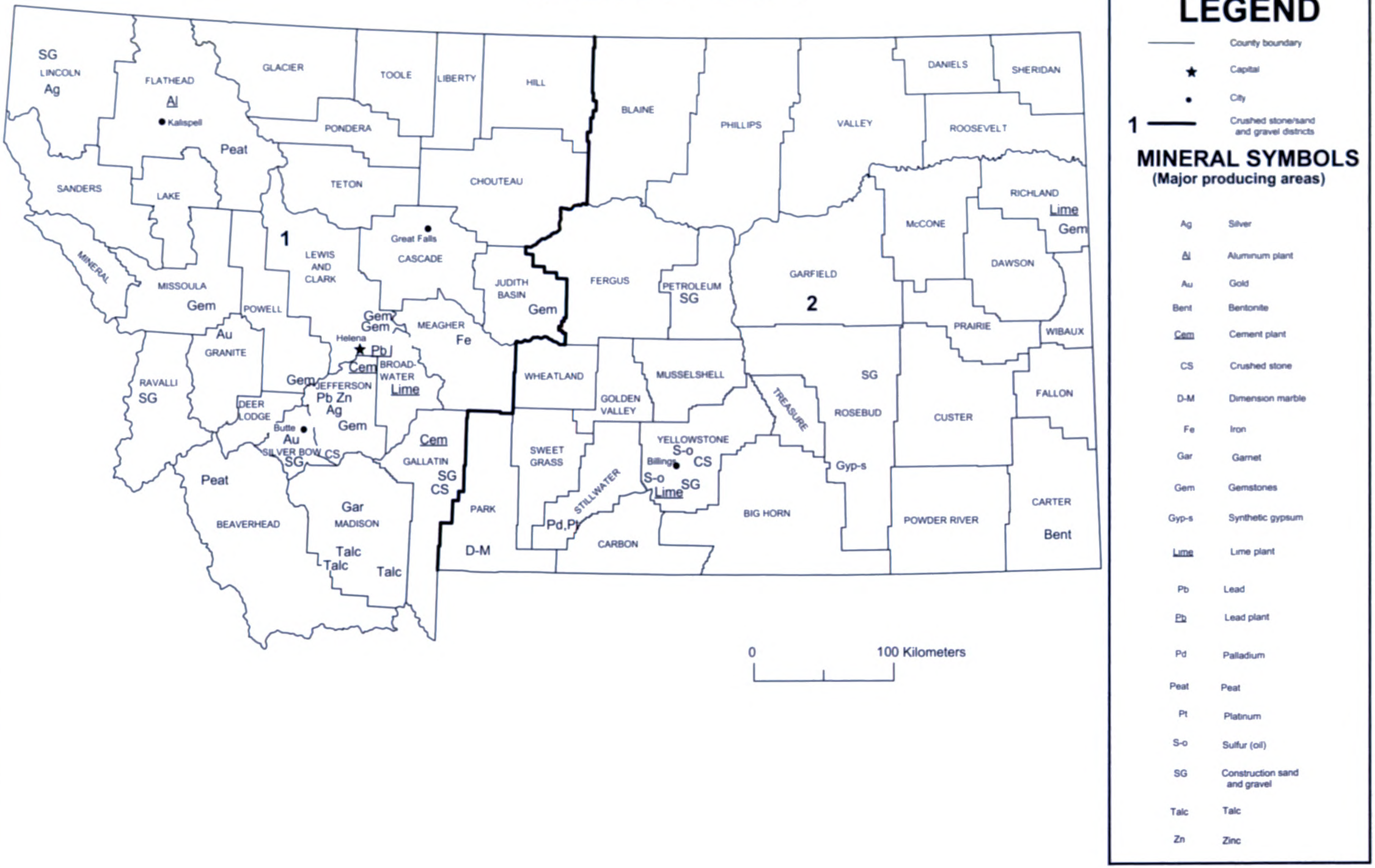
1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes plaster and gunite sands.

3/ Includes filtration, roofing granules, and snow and ice control.

4/ Reported and estimated production without a breakdown by end use.

MONTANA



Source: Montana Bureau of Mines and Geology/U.S. Geological Survey (2001)

THE MINERAL INDUSTRY OF MONTANA

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Montana Bureau of Mines and Geology for collecting information on all nonfuel minerals.

In 2001, the estimated value[1] of nonfuel mineral production for Montana was $503 million, based upon preliminary U.S. Geological Survey (USGS) data. This was about a 15% decrease from that of 2000[2] and followed a 15.3% increase in 2000 from that of 1999. The State was 29th in rank (25th in 2000) among the 50 States in nonfuel raw mineral production value, of which Montana accounted for more than 1% of the U.S. total.

Overall, metallic minerals accounted for about 67% of the State's total nonfuel mineral value in 2001. By value, palladium was Montana's leading nonfuel mineral, followed by gold, platinum, portland cement, construction sand and gravel, and zinc. In 2000, increases of $114 million in the value of palladium and $34 million in platinum led Montana's increase in nonfuel mineral production value. Smaller increases also occurred in gold, dimension stone, and masonry cement (table 1). The largest decreases in value were those of copper (down more than $20 million), molybdenum, construction sand and gravel (down $10 million), portland cement and zinc (down about $6 million each), and talc (down about $2 million) (descending order of change). All other nonfuel minerals had relatively smaller to incremental decreases in value.

Based upon USGS estimates of the quantities produced in the 50 States in 2001, Montana continued as the only State to have mine production of primary palladium and platinum. The State remained first in the production of talc, second in bentonite, third of three States that produce industrial garnet, fifth in zinc and lead, and sixth in gold and silver. Montana increased in rank to 10th from 12th in gemstones and was a significant producer of construction sand and gravel and dimension stone.

The Montana Bureau of Mines and Geology provided the narrative information that follows.[3] Mining in Montana during 2001, like the previous year, featured generally low commodity prices and increased energy costs. Continued high electricity and natural gas prices resulted in closure or layoffs for some companies, and for others, continued care-and-maintenance status. Some operations resorted to diesel-powered generators by midyear, and railroad companies were looking at the feasibility of using locomotives to generate electricity. By fall, prices started to decline and at yearend, power rates were lower than those prior to the energy crisis.

Near Whitehall, Placer Dome Inc.'s Golden Sunlight Mine continued production of low-cost gold. The company was in higher grade ore in the bottom of the pit with no stripping costs. The result was record-breaking gold production. During the summer, the company celebrated pouring 62 metric tons (t) of gold. In Montana, only Butte has produced more gold, reaching 87 t. A sampling program of waste dumps revealed that many contained economic reserves in the top 9 meters (m). Testing indicated further enrichment could be accomplished with inexpensive screening.

Placer Dome secured an affordable power contract through June 2002. A diamond drilling program was conducted on remaining reserves below the existing pit floor at the Golden Sunlight Mine. Results were very encouraging and have led to development on the west wall for exposed reserves.

In the northwestern portion of the State, the Columbia Falls aluminum plant closed for a year and sold its contracted electricity.

New development was started in the Ophir Creek drainage north of Avon on a recently patented gold placer claim. Some overburden was stripped, test lots of pay gravel were processed, and some sizable gold nuggets were produced.

Montana Oregon Investment Group resumed operations at the Ruby-Garnet Mine, near Alder. Market and prices have been steady, but production has been down as the company completed dragline repairs. A cutter-head dredge was tested on the site with disappointing results. The company completed enough onsite reclamation to reduce its bond by two-thirds.

Barretts Minerals Inc. applied for a life-of-mine permit from the Department of Environmental Quality for its Regal pit, located east of Dillon. The application was processed and permitted within the year. Barretts has completed a centralized packing system at its plant and has increased silo storage capacity. Company representatives indicated they had seen market expansion in some specialty areas. However, in general, demand was down, and prices were steady, while shipping and production costs were up due to increased energy prices.

In East Helena, the ASARCO Incorporated lead smelter was put on care-and-maintenance status. The company cited low lead and precious-metal prices as the major reasons for the closure decision.

Continental Lime Inc. at Townsend changed its name to Graymont Western US Inc. It applied for a mine expansion permit on the North Ridge deposit, which contains 9 million metric tons of reserves. Because of the increase in energy costs, the company has been experimenting with alternative fuels. Graymont has enjoyed a thriving business in hydrated lime, a side benefit of the numerous repaving projects across Montana. Hydrated lime is an effective anti-stripping additive in asphalt. Company officials have indicated demand has been steady for their burnt-lime product.

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[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2001 USGS mineral production data published in this chapter are preliminary estimates as of August 2002 and are expected to change. For some mineral commodities, such as construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Specialist contact information may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals/contacts/comdir.html; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2] Values, percentage calculations, and rankings for 2000 may differ from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also change.

[3] Robin B. McCulloch, Associate Research Mining Engineer, authored the text of the State mineral industry information provided by the Montana Bureau of Mines and Geology.

East of Lewistown, Small Mines Development and Vortex Mining Co. have entered into a joint venture to produce Yogo sapphires. The new company is called Belt Creek Mining Co. After 1 year, the new company has nearly completed a decline, has constructed a new wash plant, and has started research on different methods of mining. The plant has more than doubled production capabilities and has almost eliminated downtime. During next year, the company plans to complete a piece of experimental equipment designed to allow excavation of the sapphire-bearing material using high-pressure water jets. It is hoped that this will eliminate fracturing of the stones due to blasting.

The largest mining operation in Montana continued to be Stillwater Mining Co. It has two mines, Stillwater and East Boulder, located south of Interstate 90 between Big Timber and Columbus. Its smelter, base-metal refinery, warehouses, and corporate offices are located in Columbus.

Stillwater's East Boulder project, located south of Big Timber, felt the strongest impact from a more than $500 per ounce drop in palladium prices. Commodity analysts have indicated the price reduction reflected the softening economy, an expected reduction in the demand for new vehicles, and lower palladium loading in catalytic converters. The company's response was to terminate some external development contracts at both mines, but primarily at East Boulder, resulting indirectly in eliminating nearly 300 miners. Some of those casualties were hired back to complete mine development that had been previously contracted.

Current development stands at 2,043 m of footwall lateral and two 4,880-m crosscuts to the ore body. The company has completed the mill and pond. Development is focusing on ramps that will allow current production to expand from 320 to 450 metric tons per day (t/d) to 900 t/d. The mill was designed for 2,700 t/d, but will not expand to that volume in the near future. The conveyor haulage system to the surface is not complete; rail haulage will continue as the ore transport method.

The Stillwater Mine will maintain production at the current 2,300 t/d. External development contracts have been curtailed—if not eliminated. Annual production is about 3.1 metric tons of platinum-group metals (PGM). The company had problems with the paste-fill system early in 2001 but installed duplicate pipelines to eliminate future problems. Although it experienced three fatalities during the year, the company indicated its overall safety record was greatly improved.

At Columbus, the copper circuit was completed at the base-metal refinery and a second converter was completed in the smelter. The company also recycles automotive catalytic converters in the smelter. The feasibility of underground development is being looked at very closely.

Exploration activity in Montana continued to be depressed with no major-company activity. The few existing programs are privately funded, focused on precious metals, and quite limited in scope.

North of Butte, O.T. Mining Corp. conducted an extensive exploration program on and around the Ruby Mine. Early in the year, the company flew a geophysical survey of the area and followed that with soil grids for a mobile-metal-ion geochemical survey. In the fall, it completed a reverse-circulation drilling program in breccia zones and soil-indicated targets. The company expected to complete this phase with deep diamond drilling in the spring.

Idaho Consolidated Metals Corp. continued exploration of chromite zones and geophysical targets in the Stillwater Complex. The objective was to find PGM-bearing zones overlooked by Stillwater Mining Co. Much of the diamond drilling was focused on geophysical targets near Absarokee. Results were rumored to have been disappointing, and drilling was terminated prior to completion.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN MONTANA 1/ 2/

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral		1999		2000		2001 p/	
		Quantity	Value	Quantity	Value	Quantity	Value
Clays, bentonite		W	W	W	W	185	10,600
Gemstones		NA	294	NA	267	NA	267
Gold 3/	kilograms	7,540	82,800	9,310	83,800	W	W
Lead 3/	metric tons	7,950	7,660	W	W	W	W
Palladium 3/	kilograms	9,800	114,000	10,300	228,000	12,000	177,000
Platinum 3/	do.	2,920	35,600	3,110	69,200	3,600	52,800
Sand and gravel, construction		12,000	50,700	9,950	40,600	11,000	45,600
Stone:							
Crushed		3,480 r/	13,400 r/	3,070	12,600	3,200	13,600
Dimension	metric tons	9,500	1,440	W	W	W	W
Zinc 3/	do.	22,200	26,100	16,400 r/	20,200 r/	24,000 e/	23,800 e/
Combined values of cement [masonry (2000-01), portland], clays [bentonite(1999-2000), common], copper (1999-2000), garnet (industrial), iron ore [usable (1999)], lime, molybdenum concentrates, (1999-2000), peat, silver, talc and values indicated by symbol W		XX	183,000 r/	XX	139,000 r/	XX	179,000
Total		XX	515,000 r/	XX	594,000 r/	XX	503,000

e/ Estimated. p/ Preliminary. r/ Revised. NA Not available. W Withheld to avoid disclosing company proprietary data; values included with "Combined values" data. XX Not applicable.

1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/ Data are rounded to no more than three significant digits; may not add to totals shown.

3/ Recoverable content of ores, etc.

TABLE 2
MONTANA: CRUSHED STONE SOLD OR USED, BY KIND 1/

Kind	1999				2000			
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone	9	2,710	$10,600	$3.92	8	2,300	$9,650	$4.20
Granite	3	238	846	3.55	3	161	620	3.85
Sandstone and quartzite	4	W	W	W	4	W	W	W
Traprock	3	W	W	W	2	W	W	W
Miscellaneous stone	7 r/	184 r/	630 r/	3.42 r/	11	59	229	3.88
Total or average	XX	3,480 r/	13,400 r/	3.86 r/	XX	3,070	12,600	4.12

r/ Revised. W Withheld to avoid disclosing company proprietary data; included in "Total." XX Not applicable.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 3
MONTANA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+1 1/2 inch):			
Riprap and jetty stone	13	$73	$5.62
Filter stone	(3/)	(3/)	(3/)
Coarse aggregate, graded:			
Concrete aggregate, coarse	6	23	3.83
Railroad ballast	W	W	4.42
Fine aggregate (-3/8 inch), stone sand, bituminous mix or seal	W	W	3.86
Coarse and fine aggregates:			
Graded road base or subbase	W	W	4.04
Unpaved road surfacing	118	452	3.83
Other coarse and fine aggregates	16	58	3.63
Other construction materials	25	89	3.56
Agricultural, poultry grit and mineral food	W	W	17.75
Chemical and metallurgical:			
Cement manufacture	W	W	3.57
Lime manufacture	W	W	5.53
Sulfur oxide removal	197	816	4.14
Special, mine dusting or acid water treatment	W	W	10.00
Other miscellaneous uses and specified uses not listed	W	W	5.33
Unspecified: 4/			
Reported	46	180	3.91
Estimated	1,300	4,600	3.51
Total or average	1,340	4,730	3.52
Grand total or average	3,070	12,600	4.12

W Withheld to avoid disclosing company proprietary data; included in "Grand total."

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Includes granite, limestone, miscellaneous stone, sandstone and quartzite, and traprock.

3/ Less than ½ unit.

4/ Reported and estimated production without a breakdown by end use.

TABLE 4
MONTANA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

	District 1		District 2		Unspecified districts	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1 1/2 inch) 2/	W	W	W	W	--	--
Coarse aggregate, graded 3/	W	W	W	W	--	--
Fine aggregate (-3/8 inch) 4/	W	W	--	--	--	--
Coarse and fine aggregate 5/	W	W	W	W	--	--
Other construction materials	25	89	--	--	--	--
Agricultural 6/	--	--	W	W	--	--
Chemical and metallurgical 7/	W	W	W	W	--	--
Special 8/	W	W	(9/)	W	--	--
Other miscellaneous uses 10/	W	W	--	--	--	--
Unspecified: 11/						
Reported	26	99	19	74	2	6
Estimated	670	2,400	630	2,200	--	--
Total	1,820	7,690	1,250	4,940	2	6

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes filter stone and riprap and jetty stone.

3/ Includes concrete aggregate (coarse) and railroad ballast.

4/ Includes stone sand (bituminous mix or seal).

5/ Includes graded road base or subbase, unpaved road surfacing, and other coarse and fine aggregates.

6/ Includes poultry grit and mineral food.

7/ Includes cement manufacture, lime manufacture, and sulfur oxide removal.

8/ Includes mine dusting or acid water treatment.

9/ Less than ½ unit.

10/ Includes other specified uses not listed.

11/ Reported and estimated production without a breakdown by end use.

TABLE 5
MONTANA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	1,200	$5,920	$4.93
Plaster and gunite sands	4	18	4.50
Concrete products (blocks, bricks, pipe, decorative, etc.)	21	64	3.05
Asphaltic concrete aggregates and other bituminous mixtures	869	5,020	5.78
Road base and coverings	2,450	9,150	3.73
Road stabilization (lime)	15	24	1.60
Fill	445	989	2.22
Snow and ice control	140	603	4.31
Railroad ballast	25	188	7.52
Filtration	24	127	5.29
Other miscellaneous uses	140	749	5.35
Unspecified: 2/			
Reported	694	2,640	3.81
Estimated	3,900	15,000	3.86
Total or average	9,950	40,600	4.08

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Reported and estimated production without a breakdown by end use.

TABLE 6
MONTANA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

	District 1		District 2		Unspecified districts	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregates (including concrete sand)	888	3,890	312	2,030	--	--
Plaster and gunite sands	3	18	--	--	--	--
Concrete products (blocks, bricks, pipe, decorative, etc.)	20	64	--	--	--	--
Asphaltic concrete aggregates and road base materials 2	2,320	9,440	1,020	4,760	--	--
Fill	408	892	38	97	--	--
Other miscellaneous uses 3	309	1,570	20	100	--	--
Unspecified: 4						
Reported	558	2,200	--	--	136	438
Estimated	3,000	11,000	940	3,800	--	--
Total	7,490	29,400	2,320	10,800	136	438

-- Zero.

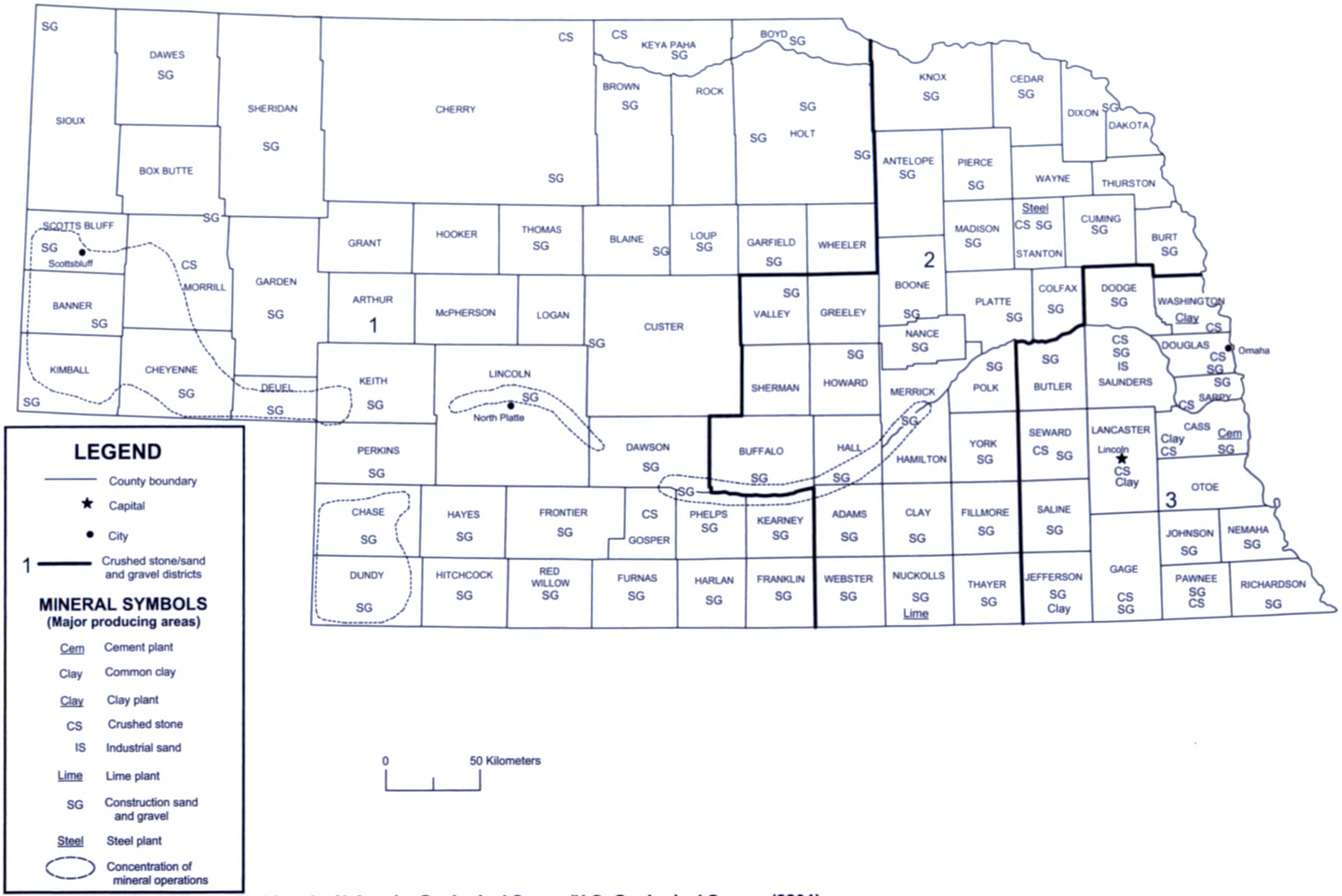
1 Data are rounded to no more than three significant digits; may not add to totals shown.

2 Includes road and other stabilization (lime).

3 Includes filtration, railroad ballast, and snow and ice control.

4 Reported and estimated production without a breakdown by end use.

NEBRASKA



Source: University of Nebraska-Lincoln, Nebraska Geological Survey/U.S. Geological Survey (2001)

THE MINERAL INDUSTRY OF NEBRASKA

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the University of Nebraska-Lincoln, Nebraska Geological Survey, for collecting information on all nonfuel minerals.

In 2001, the estimated value[1] of nonfuel mineral production for Nebraska was $91.4 million, based upon preliminary U.S. Geological Survey (USGS) data. This was about a 9% increase from that of 2000[2] and followed a 3.6% decrease from 1999 to 2000. Because data for industrial sand and gravel and masonry and portland cements were withheld to protect company proprietary data, the actual total values for 1999-2001 are substantially higher than those reported in table 1.

In 2001, Nebraska's leading nonfuel minerals, in descending order of value, were portland cement, crushed stone, and construction sand and gravel, as has been true for the past several years. In 2000, decreases in the values of crushed stone and construction sand and gravel, down $2.1 million and $11.6 million, respectively, accounted for the State's drop in value. While the value of industrial sand and gravel was up, those of portland and masonry cements were down, slightly.

Compared with USGS estimates of the quantities of minerals produced in the 50 States during 2001, Nebraska was a significant producer of construction sand and gravel. Metals produced in the State, mostly that of raw steel, were processed from materials acquired from other domestic and foreign sources.

The following narrative information was provided by the Nebraska Geological Survey[3] (NGS). Nebraska's mineral industry experienced economic setbacks in 2001, but it retained vitality. Multiple companies are seeking to expand their mining operations and their regional-to-national markets.

Limestone operations in the State continued to find relatively consistent markets, and a general interest in finding new sources of aggregate and cement-grade materials emerged. Ash Grove Cement Co. (Louisville), which operates the only cement plant in the State, obtained a permit to screen and reclaim waste fines from a limestone aggregate mining operation at Weeping Water in 1998. These waste fines are now trucked 15 kilometers to the Louisville plant as an important source of low-magnesium limestone for cement kiln feed. The removal of waste fines from Weeping Water also facilitates reclamation. A total of 1,351,794 metric tons (t) of fines has been reclaimed, and 1,264,962 t has actually been incorporated into the cement manufacturing process. An existing 86,832 t limestone fines inventory at the Louisville plant will eventually be consumed, as will the remaining estimated 450,000 to 900,000 t remaining at Weeping Water.

The vast majority of limestone mined in Nebraska is used for various aggregate applications, cements, and agricultural lime. Limestone wall rock (limestone used for making walls), however, is currently produced from the Ervine Creek Limestone Member (Upper Pennsylvanian) by B&R Wallrock near Weeping Water.

Yankee Hill Brick Co. (Lincoln), which uses kaolin and illite-smectite clays from the Cretaceous Dakota Formation, is operating at capacity and mined approximately 54,000 t of raw materials in 2001. The company also introduced a new product line of embedded brick veneer for precast concrete panels, which has already been used in a major construction project at Ford Field baseball stadium in Detroit, MI. Endicott Clay Products (Endicott) also uses Dakota clays for glazed ware, tile, pavers, face and residential brick, swimming pool coping, and brick murals. Endicott has upgraded its processing facilities with a Stedman impactor for crushing clay and with scalping screens to remove fines before initial crushing runs, thereby increasing overall efficiency. More efficient mills and handling equipment for the prefiring stage have also been installed.

Blair Ag LLC (Blair) processes attapulgite (palygorskite) from Florida into liquid clay, a suspension agent for feed and fertilizer solids. With the acquisition of rail unloading capacity, the company has now shifted from truck shipments of raw material to more economical rail shipments.

Ongoing mineral-industry-related legislative and legal issues in the State are dominated by the relevance and application of U.S. Environmental Protection Agency air quality regulations to limestone mining operations and a dispute about a multi-State low-level radioactive waste disposal compact. Furthermore, sand and gravel producers in Nebraska have expressed concerns about the potential economic impacts of the proposed Platte River Recovery Plan, as discussed in reports to the Land Committee, Third Party Subcommittee, U.S. Bureau of Reclamation.

Two former limestone quarry sites, one south of Lincoln and one at Ashland, have been converted into high-value residential properties, and, at the Ashland site, a golf course. These projects have made use of post-mining topography and water-filled pits to produce unique and aesthetically pleasing landscapes. A former underground diatomite mine at Scotia, NE, which once supplied paint filler, poultry-feed additive, abrasive, and even building stone (case-hardened diatomite near the surface), has been reopened as a tourist attraction.

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[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2001 USGS mineral production data published in this chapter are preliminary estimates as of August 2002 and are expected to change. For some mineral commodities, such as construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Specialist contact information may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals/contacts/comdir.html; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals/.

[2] Values, percentage calculations, and rankings for 2000 may differ from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also change.

[3] Matthew Joeckel, Research Geologist with the University of Nebraska-Lincoln and the Nebraska Geological Survey (NGS), authored the text of the State mineral industry information provided by the NGS.

The University of Nebraska Conservation and Survey Division (CSD) of the Nebraska Geological Survey received multiple inquiries about subsurface limestone mining, clay resources, and ornamental gravel deposits in 2001. Suburban expansion in the Lincoln-Omaha-Council Bluffs (Iowa) metropolitan area, recently projected to reach a population of 2 million by 2050, will probably strain local sources of limestone, limestone aggregate, and construction sand and gravel by impinging on current production areas and could prevent potential new development. Therefore, the CSD encouraged local producers and planners to consider long-term resource planning.

Through the University, the CSD has been granted custody of over 100 deep cores drilled by Molycorp, Inc. through the REE-bearing Elk Creek carbonatite igneous intrusive in Johnson and Pawnee Counties. These cores will gradually be available for detailed research in coming years. Mineral-related research at the CSD in 2001 focused on the Elk Creek carbonatite cores as well as the stratigraphy, sedimentology, and underground mining of the Plattsmouth Limestone Member (Upper Pennsylvanian) in Cass County, NE, and Miocene lacustrine diatomites in Greeley County.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN NEBRASKA 1/ 2/

(Thousand metric tons and thousand dollars)

Mineral	1999		2000		2001 p/	
	Quantity	Value	Quantity	Value	Quantity	Value
Cement:						
Masonry	W	(3/)	W	(3/)	W	(3/)
Portland	W	(3/)	W	(3/)	W	(3/)
Clays, common	133	(3/)	133	338	133	340
Gemstones	NA	3	NA	3	NA	3
Lime	18	1,510	20	1,690	20	1,200
Sand and gravel:						
Construction	12,000	40,800	11,700	39,200	10,700	36,300
Industrial	W	(3/)	W	(3/)	W	(3/)
Stone, crushed	7,090	44,500	6,590	42,400	8,100	53,600
Total	XX	86,800	XX	83,700	XX	91,400

p/ Preliminary. NA Not available. W Withheld to avoid disclosing company proprietary data. XX Not applicable.

1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/ Data are rounded to no more than three significant digits; may not add to totals shown.

3/ Value excluded to avoid disclosing company proprietary data.

TABLE 2
NEBRASKA: CRUSHED STONE SOLD OR USED, BY KIND 1/

(Thousand metric tons)

Kind	1999				2000			
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone	11	7,090	$44,500	$6.28	11	6,590	$42,400	$6.43

1/ Data are rounded to no more than three significant digits.

TABLE 3
NEBRASKA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE 1/

Use	Quantity (thousand (metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+1 1/2 inch):			
Riprap and jetty stone	174	$1,760	$9.62
Filter stone	W	W	8.27
Other coarse aggregate	73	343	4.70
Total or average	247	2,100	8.52
Coarse aggregate, graded:			
Concrete aggregate, coarse	W	W	8.39
Bituminous aggregate, coarse	W	W	7.61
Railroad ballast	W	W	7.38
Other graded coarse aggregate	1,600	13,000	8.09
Fine aggregate (-3/8 inch):			
Screening, undesignated	30	116	3.87
Other fine aggregate	4	15	3.75
Total or average	34	131	3.85
Coarse and fine aggregates:			
Unpaved road surfacing	272	2,460	9.06
Terrazzo and exposed aggregate	(2/)	(2/)	4.00
Crusher run or fill or waste	470	3,590	7.63
Roofing granules	(2/)	(2/)	7.00
Agricultural:			
Agricultural limestone	119	787	6.61
Poultry grit and mineral food	W	W	15.76
Other agricultural uses	214	2,620	12.24
Total or average	333	3,410	10.23
Chemical and metallurgical:			
Cement manufacture	(2/)	(2/)	3.21
Flux stone	(2/)	(2/)	8.00
Special, asphalt fillers or extenders	(2/)	(2/)	18.86
Other miscellaneous uses, pipe bedding	(2/)	(2/)	7.25
Unspecified, reported 3/	1,990	12,000	6.01
Grand total or average	6,590	42,400	6.43

W Withheld to avoid disclosing company proprietary data; included with "Other."

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Withheld to avoid disclosing company proprietary data; included in "Grand total."

3/ Reported production without a breakdown by end use.

TABLE 4
NEBRASKA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE AND DISTRICT 1/ 2/

(Thousand metric tons and thousand dollars)

Use	District 3 Quantity	District 3 Value
Construction:		
Coarse aggregate (+1 1/2 inch) 3/	247	2,100
Coarse aggregate, graded 4/	1,600	13,000
Fine aggregate (-3/8 inch) 5/	W	W
Coarse and fine aggregate 6/	762	6,190
Agricultural 7/	333	3,410
Chemical and metallurgical 8/	W	W
Special 9/	W	W
Other miscellaneous use 10/	W	W
Unspecified, reported 11/	1,990	12,000
Total	6,590	42,400

W Withheld to avoid disclosing company proprietary data; included in "Total."

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ No production reported in Districts 1 and 2.

3/ Includes filter stone, riprap and jetty stone, and other coarse aggregate.

4/ Includes bituminous aggregate (coarse), concrete aggregate (coarse), railroad ballast, and other graded coarse aggregate.

5/ Includes screening (undesignated) and other fine aggregate.

6/ Includes crusher run (select material or fill), roofing granules, terrazzo and exposed aggregate, and unpaved road surfacing.

7/ Includes agricultural limestone, poultry grit and mineral food, and other agricultural uses.

8/ Includes cement manufacture and flux stone.

9/ Includes asphalt fillers or extenders.

10/ Includes pipe bedding.

11/ Reported production without a breakdown by end use.

TABLE 5
NEBRASKA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate and concrete products	1,160	$4,330	$3.73
Plaster and gunite sands	53	148	2.79
Asphaltic concrete aggregates and other bituminous mixtures	513	1,760	3.44
Road base and coverings 2/	1,690	5,380	3.18
Fill	404	739	1.83
Snow and ice control	56	185	3.30
Roofing granules	12	38	3.17
Other miscellaneous uses	15	129	8.60
Filtration	(3/)	1	3.86
Unspecified: 4/			
Reported	1,670	4,740	2.83
Estimated	6,200	22,000	3.54
Total or average	11,700	39,200	3.34

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes road and other stabilization (lime).

3/ Less than 1/2 unit.

4/ Reported and estimated production without a breakdown by end use.

TABLE 6
NEBRASKA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3		Unspecified districts	
Use	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products 2/	256	872	532	2190	427	1,420	--	--
Asphaltic concrete aggregates and other bituminous mixtures	186	496	W	W	W	W	--	--
Road base materials 3/	727	1,810	773	2,620	193	962	--	--
Fill	58	91	226	432	120	216	--	--
Snow and ice control	16	29	26	92	14	65	--	--
Other miscellaneous uses 4/	19	100	261	987	72	350	--	--
Unspecified: 5/								
Reported	532	879	252	485	890	3,370	--	--
Estimated	760	2,500	2,900	9,900	2,500	9,200	48	180
Total	2,550	6,750	4,970	16,700	4,170	15,600	48	180

W Withheld to avoid disclosing company proprietary data; included with "Other miscellaneous uses." -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

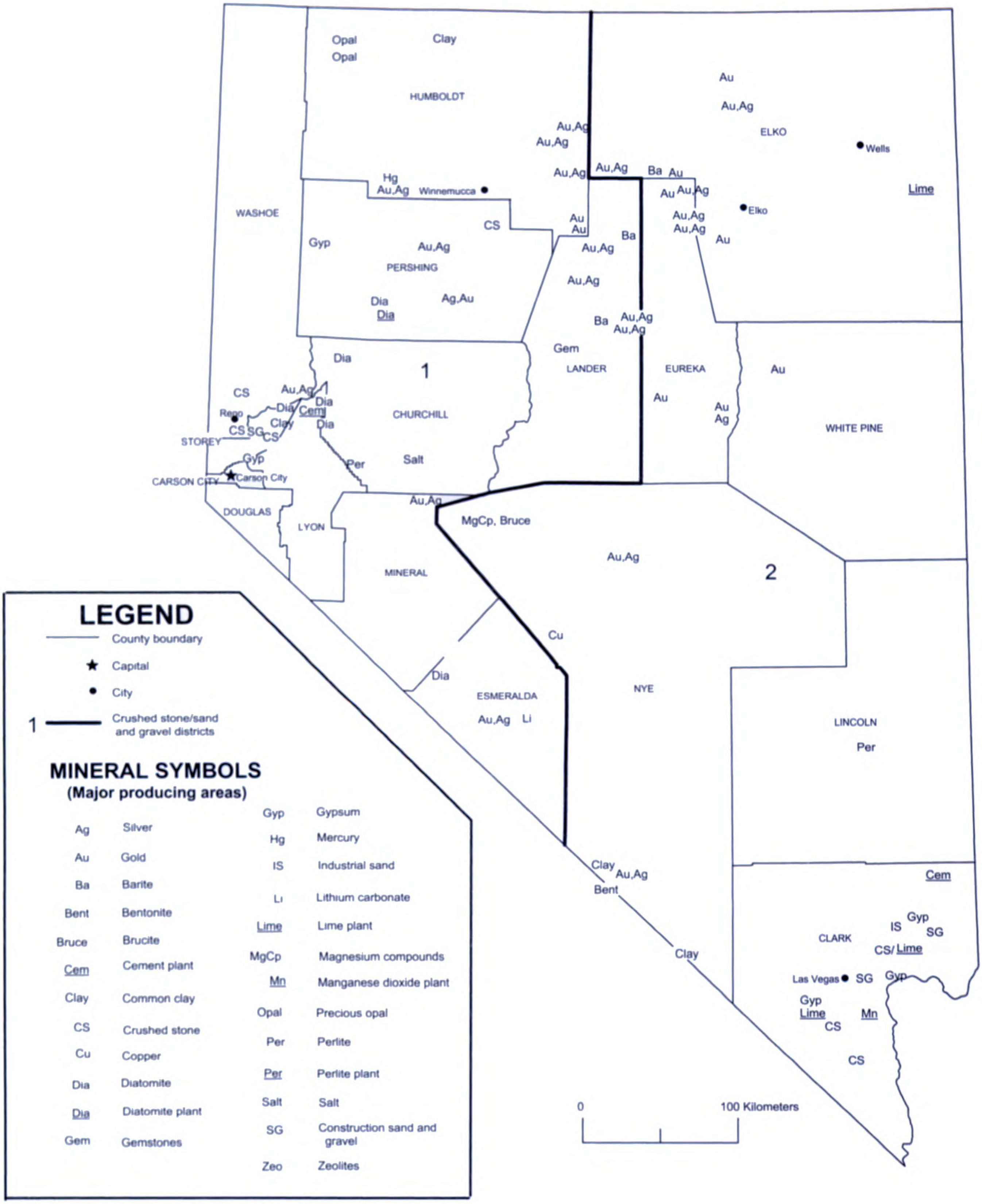
2/ Includes plaster and gunite sands.

3/ Includes road and other stabilization (lime).

4/ Includes filtration and roofing granules.

5/ Reported and estimated production without a breakdown by end use.

NEVADA



Source: Nevada Bureau of Mines and Geology/U.S. Geological Survey (2001)

The Mineral Industry of Nevada

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Nevada Bureau of Mines and Geology for collecting information on all nonfuel minerals.

In 2001, the estimated value[1] of nonfuel raw mineral production for Nevada was $2.93 billion, based upon preliminary U.S. Geological Survey (USGS) data. This was a 1.6% decrease from that of 2000[2] and followed a 3.5% increase in 2000 from 1999. The State continued to be second in the Nation in nonfuel mineral production value, of which Nevada accounted for about 7.5% of the U.S. total.

Nevada, the Nation's leading State in gold production and silver production, provided 75% and 33% of the Nation's gold and silver, respectively. The "Silver State" has been first in silver production since 1987, as well as first in gold since 1981. In 2001, gold accounted for 81% of Nevada's nonfuel raw mineral production value, followed by construction sand and gravel with more than 5% and silver with about 3% of the State's total value. In 2000, increases in the values of gold, up $100 million, construction sand and gravel, up $30 million, lime, up $6 million, portland cement, up $5 million, and magnesite, up $2 million, plus some smaller increases from other minerals, more than offset nonfuel mineral commodity decreases, especially those of copper, down about $40 million, lithium carbonate, down $5 million, and diatomite, down about $2 million, resulting in the State's increase in value for the year. All other nonfuel minerals showed changes in value of less than $1 million (table 1). Copper production and value decreased significantly from 1999 to 2000 because of the closing of BHP Copper Co.'s Robinson Mine, which ceased production at the end of June 1999.

Based upon USGS estimates of the quantities produced in the 50 States during 2001, Nevada continued to be the only State to produce magnesite, lithium minerals, and mercury (descending order of value). The State remained first of three barite-producing States and first of two States that produce brucite, second of four diatomite-producing States, fifth in lead, sixth in perlite, and seventh in lime. While Nevada rose in rank to third from fourth in gypsum, it dropped to eighth from fourth in gemstones. Additionally, significant quantities of construction sand and gravel (11th in State ranking) and industrial sand and gravel (descending order of value) were produced in the State.

The following narrative information was provided by the Nevada Bureau of Mines and Geology (NBMG).[3] Production data in the following text are those reported by the NBMG, based upon its own surveys, estimates, and information gathered from company annual reports. The NBMG data are reported by that agency to be nonproprietary data and may differ from some USGS preliminary estimates and production figures as reported to and estimated by the USGS.

Metals

Nevada produced 253,000 kilograms (kg) of gold in 2001 along with 543,000 kg of silver. Production of both metals declined compared with that of 2000. Nevada maintained its place as the leading gold- and silver-producing State in the United States with 29 mines reporting gold production and 25 mines producing silver during 2001 (Tingley and LaPointe, 2002). Newmont Mining Corp.'s Nevada operations, which include all of Newmont's Carlin Trend mines, the Rain, the Twin Creeks, the Lone Tree, the Mule Canyon, and the Trenton Canyon Mines as well as the Phoenix Property at Battle Mountain, reported production of 84,078 kg of gold in 2001, easily maintaining its place as the largest gold-producing company in Nevada. Barrick Gold Corp., with production of 70,376 kg of gold, remained in second place in output in Nevada. On December 14, 2001, Barrick acquired Newmont's Homestake Mining Co.

For the second consecutive year, Barrick's Betze-Post Mine was the largest Nevada gold mine, producing 48,210 kg in 2001. Placer Dome Inc.'s Cortez operation (Pipeline Mine) remained in second place in 2001 with 36,849 kg. Barrick's Meikle underground mine reported 2001 production of 22,167 kg, and Newmont's Twin Creeks Mine produced 25,877 kg. Other major gold producers in 2001 included Smoky Valley Common Operation's Round Mountain Mine, 23,233 kg; AngloGold Limited/Meridian Gold Inc.'s Jerritt Canyon Mine, 9,186 kg; Normandy Mining Ltd.'s Ken Snyder Mine, 6,175 kg; Homestake's Rudy Hill Mine, 4,191 kg; Florida Canyon Mining Co.'s Florida Canyon Mine, 3,770 kg; and Placer Dome's Bald Mountain Mine, 3,371.

The Rochester Mine, operated by Coeur D'Alene Mines Corp., was Nevada's largest silver producer in 2001, producing 201,517 kg. Echo Bay Minerals Co.'s McCoy/Cove Mine produced 200,668 kg, and Normandy's Ken Snyder Mine produced 74,438 kg. Other large silver-producing operations included the Denton-Rawhide Mine, 22,615 kg; the Round Mountain Mine, 15,835 kg; and Barrick's Meikle Mine, 6,637 kg. Newmont's Carlin operations produced a total of 8,126 kg of silver.

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[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2001 USGS mineral production data published in this chapter are preliminary estimates as of August 2002 and are expected to change. For some mineral commodities, such as construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Specialist contact information may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals/contacts/comdir.html; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2] Values, percentage calculations, and rankings for 2000 may differ from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also change.

[3] Joseph V. Tingley, Daphne D. La Pointe, and Stephen B. Castor, Research Geologists, and David A. Davis, Geologic Information Specialist, coauthored the text of the State mineral industry information provided by the Nevada Bureau of Mines and Geology.

Equatorial Tonopah, Inc. produced 3,256 metric tons (t) of copper in 2001 from the Tonopah Copper Mine in Nye County. Until it closed in July 2001, the mine had been the only copper mine in Nevada.

In 2001, underground mines dominated startups in Nevada. Newmont's Deep Post Mine began production in March, the new Lee Smith Mine at Jerritt Canyon was dedicated in September, and Barrick's Rodeo Mine was moving into production in December. Newmont planned to produce 12,441 kilograms per year (kg/yr) of gold at Deep Post, and Barrick, 10,886 kg/yr of gold at Rodeo.

Late in 2001, Barrick announced that it will close the Ruby Hill Mine near Eureka by the end of 2002. Placer Dome Inc. announced that it would write off the Getchell Property in Humboldt County. Placer Dome will maintain the property, but production plans have been suspended.

Industrial Minerals

The total value of industrial minerals produced in Nevada in 2001, an estimated $424 million, was about 7% more than the value in 2000. In order of estimated value, the most important industrial minerals in 2001 were construction aggregate, lime, diatomite, cement, gypsum, barite, lithium, magnesia, and silica, each valued at more than $10 million. Commodities with values of less than $10 million were dolomite, limestone, perlite, dimension stone, salt, and gemstones. Borate and zeolite were processed in Nevada but mined nearby in California. Data used for these estimates and data reported for individual commodities below were obtained from the Nevada Division of Minerals or directly from companies that produced the industrial minerals.

In 2001, construction aggregate production in Nevada had an approximate total value of $158 million, far less than that of gold but higher than that of other commodities mined in the State. In 2001, State aggregate production was estimated to be 35 million metric tons (Mt), which was 25% higher than that of 2000 because substantial production capacity was added in the Las Vegas area that had not been part of prior year estimates. Aggregate produced from sand and gravel deposits accounted for about 80% of aggregate production statewide, with crushed stone and lightweight aggregate making up the balance. Construction aggregate produced in the Las Vegas area was estimated to be 26 Mt, an increase of about 35% from 2000. This includes an estimated 8 Mt largely of base aggregate produced by portable crushers in Las Vegas in 2001 that was not part of the data compiled in earlier years. Continued demand in the Las Vegas area will likely maintain production, and the planned new Ivanpah Valley airport and attendant urbanization south of Las Vegas constitute major future markets.

Companies in the Las Vegas area that produced more than 1 Mt of aggregate in 2001, ranked in approximate order of tonnage produced, were Las Vegas Paving Corp., Rinker Materials Corporation, Nevada Ready Mix Corp., and Frehner Construction Co., Inc. Other important producers were Wells Cargo Inc., CTC Crushing LLC, Hollywood Gravel Co., and Diamond Construction Co.

Las Vegas Paving Corp. produced sand and gravel from the Las Vegas landfill, a pit in the Lone Mountain area, and ran portable crushing operations. Rinker (a subsidiary of CSR Group) produced sand and gravel from the Buffalo Road and the Blue Diamond pits and from granite mined at the El Dorado pit near Railroad Pass, all of which had been previously owned by Hanson Aggregates West. In December, Las Vegas Paving purchased the Blue Diamond pit from Rinker.

Nevada Ready Mix mined all its aggregate from an open pit in an alluvial fan in the Lone Mountain area. Frehner mined and crushed limestone from the Sloan Property originally acquired from Chemical Lime Co. Community pits and other aggregate mining facilities administered by the U.S. Bureau of Land Management (BLM) and operated by several companies provided about 2.5 Mt to the Las Vegas area total in 2001.

Sand and gravel operations accounted for about 89% of the aggregate used in the Las Vegas metropolitan area in 2001, with crushed stone and lightweight aggregate making up the balance. The most important source of sand and gravel aggregate for Las Vegas was the Lone Mountain area northwest of Las Vegas, which accounted for more than 5 Mt in 2001. Significant production came from sand and gravel pits in the long-productive Buffalo Road area in the southwest part of Las Vegas. The Las Vegas landfill in Apex northeast of Las Vegas also has become an important sand and gravel production site. Since about 1994, portable crushers operating at construction sites have become increasingly important producers of base aggregate; in 2001, estimates by industry members put portable crusher production at as much as 30% of the total aggregate production for Las Vegas. The most important crushed stone producers in the Las Vegas area were Rinker near Railroad Pass and Frehner at Sloan. The Southern Nevada Lightweight operation near Jean mainly produced aggregate for lightweight cement block and sand for use in stucco. Lightweight aggregate was also shipped from Nye County into the Las Vegas area by Cind-R-Lite Block Co. from a cinder cone near Amargosa Valley. In 2001, D&H Mining Limited Partnership announced that it intended to produce rhyolitic lightweight near Beatty. The company planned to mine spicerite, a strong, bright white hydrothermally altered tuff that it will market in southern Nevada and southern California for use in block.

Production of aggregate in the Reno-Sparks-Carson City area was about 6 Mt, unchanged from that of 2000. Martin Marietta Materials Inc. and Granite Construction Co. produced more than 1 Mt of aggregate in 2001. Martin Marietta acquired Rocky Ridge Inc. and Sha-Neva Inc., related companies that operated a major crushed stone operation, and smaller sand and gravel pits north of Reno. Granite Construction continued to produce aggregate from four pits in the area. All-Lite Aggregate Co., Rilite Aggregate Co., Paiute Pit Aggregates Co., Frehner Construction, and A&K Earthmovers, Inc. were also important producers. All-Lite and Paiute are part of the U.S. holding company RMC Industries (owned by United Kingdom-based RMC Group PLC). Crushed rock operations of Martin Marietta, Granite Construction, and Frehner Construction and lightweight rhyolite aggregate from All-Lite, Rilite, and Naturalite Aggregate Corp. accounted for about 60% of the aggregate used in 2001 in the Reno-Sparks-Carson City area.

Aggregate was also produced outside of the major metropolitan area. Operators in Nye County produced an estimated 500,000 t of aggregate in 2001. More than 90% of this material was produced and used in the Pahrump area. Churchill, Elko, Lander, Lyon, and White Pine Counties produced more than 200,000 t of aggregates each; some of this material was sold into the major metropolitan areas. Douglas, Eureka, Lincoln, Mineral, and Pershing Counties produced less than 150,000 t of aggregate each in 2001.

Nevada produced about 478,000 t of barite in 2001, a slight decrease from 2000.

M.I. Drilling Fluids Co. (owned by Smith International Inc. and Schlumberger Ltd.) was again the largest Nevada barite producer in 2001, with combined production of more than 270,000 t of screened and crushed high-grade ore from the Greystone Mine and ground and bagged barite from its Battle Mountain plant, both in Lander County. Baroid Drilling Fluids Division (a subsidiary of Halliburton Co.) mined barite from the Rossi Mine in Elko County and processed it at the Dunphy Mill in Eureka County. Baker Hughes INTEQ (a division of Baker Hughes Inc.) produced barite from its Argenta property near Battle Mountain in Lander County. Standard Industrial Minerals Inc. shipped a small amount of barite in 2000 from a deposit of white, paint-grade barite at the P and S Mine in Nye County to a processing plant in Bishop, CA.

American Borate Co. mined borate minerals from the Billie underground operation in Death Valley, CA. The ore was processed at the Lathrop Wells mill in Nye County, but because the ore was from out of State, this production was not included in the estimate of total value of Nevada minerals.

Nevada Cement Co. (a subsidiary of Centex Construction Products, Inc.) produced portland cement at a plant at Fernley in Lyon County; production exceeds 500,000 metric tons per year (t/yr) of cement. Limestone was mined from Cenozoic lacustrine deposits south of Fernley, and other ingredients came mostly from northern Nevada.

Nevada clay production was about 6% lower in 2001 compared with that of 2000. IMV Nevada (owned by Mud Camp Mining Co. LLC) produced about 32,000 t of sepiolite, saponite, and bentonite from deposits in lacustrine sediments in the Ash Meadows area of Nye County. The company had a processing plant in Amargosa Valley and exported a variety of clay products worldwide. It was the only producer of sepiolite and saponite in the United States in 2001. Art Wilson Co. sold about 150 t of montmorillonite from the Jupiter Mine in Lyon County in 2001. The company also mined about 350,000 t of halloysite from a deposit near Flannigan in Washoe County for Nevada Cement Co.; however, the halloysite was not reported as clay in Nevada mineral production figures because it was included in portland cement.

Two companies mined and shipped relatively minor amounts of Nevada clay from several sites for use in high-cost specialty products. At its White Caps Mill near Beatty in Nye County, Vanderbilt Minerals Co. processed small amounts of clay from several Nevada deposits for use in pharmaceutical and cosmetic products. The clay included white bentonite from the New Discovery Mine near Beatty in Nye County and clay from such other sites in Nevada as the Blanco Mine in Esmeralda County and the Buff Mine in Pershing County. In 2001, American Colloid Co. mined some white bentonite form Coal Canyon in Pershing County; however, the company's Disaster Peak deposit in Humboldt County was idle.

In 2001, Oil-Dri Corp., the world's largest manufacturer of cat litter, proceeded with development of a montmorillonite deposit with 300 Mt of proven reserves in Hungry Valley north of Reno. The BLM ruled in 2000 that the clay is a locatable mineral, and the company completed its final Environmental Impact Statement in September 2001. The clay, which mainly comprises calcium montmorillonite, occurs in beds as much as 30 meters (m) thick and is considered to be an excellent material for clumping cat litter. The company, which planned to mine about 270,000 t/yr of raw clay material and to process it into 135,000 t/yr of industrial and consumer absorbents and 67,500 t/yr of fine-grained material for use as a flow enhancer for agricultural grain handling operations, planned to employ about 100 people at the Hungry Valley mine and plant. The project will consist of two small open pits on BLM land and a processing plant on company-owned land. At yearend 2001, despite local opposition, the company was in the process of getting Federal, State, and local approvals to operate; production startup was predicted for late 2002. Early in 2002, however, Washoe County denied permits, and the company was reconsidering its plans.

Diatomite production in Nevada decreased slightly in 2001 compared with 2000 but still accounted for about 33% of U.S. production. Nevada was the second largest producer of diatomite in the United States, surpassed only by California. Eagle-Picher Minerals, Inc. (a division of Eagle-Picher Industries, Inc., a wholly owned subsidiary of Granaria Holdings Ltd. of the Netherlands) was the second largest diatomite producer in the United States. It produced most of Nevada diatomite at three different operations that have estimated combined production of 200,000 t/yr. The most productive was the Colado operation in Pershing County, which consisted of a plant at Lovelock that made diatomaceous earth filtration products from diatomite mined northwest of Lovelock. The company also produced diatomite that was mainly used in fillers and absorbents at its Clark plant and mine in Storey County and diatomite that was used in insulation; it produced from a pit near Hazen in Lyon County.

Moltan Co. of Tennessee was the second largest diatomite miner in Nevada, producing absorbent products, cat litter, and soil conditioner at a mine and plant complex in Churchill County northeast of Fernley. Moltan (a family-owned Tennessee company) shipped diatomaceous earth products under several labels. The company produced two cat litter types in Nevada, a nonclumping product made of diatomite and a clumping product comprising diatomite and clay.

Other companies that produced diatomite in Nevada in 2000 were Celite Corp. at Hazen in Lyon County and Grefco Inc. at Basalt near the Esmeralda/Mineral Counties line. Celite (a subsidiary of World Minerals Inc., past of Alleghany Group) has a large diatomite facility in California and acquired the CR Minerals mine at Hazen and the plant in Fernley in 2001.

Las Vegas Rock produced flagstone, ashlar, boulders, and crushed landscape rock from its Rainbow Quarries near Goodsprings southwest of Las Vegas. The stone is quartzcemented sandstone that is part of the Jurassic Aztec Sandstone, which outcrops extensively in Clark County but is too friable at most localities for building stone. The company marketed cut stone and planned to produce polished slabs and custom stone shapes.

Mt. Moriah Stone quarried flaggy, light-gray quartzite from the Cambrian Prospect Mountain Quartzite at a quarry north of Baker in White Oine County. This material, which naturally splits into slabs as large as 1.5 m by 2.4 m and 10 centimeters thick, is used for slagstone and other types of uncut building stone.

In 2001, Building Stone Associates quarried purplish to greenish gray and locally blue mottled slate from the Precambrian McCoy Creek Group rocks in Egan Canyon west of Cherry Creek in White Pine County; the operation was small.

In 2001, the Nevada Bureau of Mines and Geology issued Open-File Report 01-6, entitled "Dimension Stone Study, Great Basin Development Association Area, Humboldt, Lander, Eureka, and White Pine Counties" in conjunction with Geomapping Associates Ltd. of Vermont and Converse Consultants of Reno.

Small amounts of precious opal from Virgin Valley in Humboldt County, chalcedony from the Double H Mountains in Humboldt County, turquoise from Tonopah in Nye County and near Cortez in Lander County, and crystalline amethyst and citrine from Peterson Mountain near Hallelujah Junction in Washoe County are recovered mostly as unreported stone from pay-to-dig activity. In addition, thulite has been produced from Douglas County under the trade name Lapis Nevada.

Gypsum production in Nevada decreased to 2.2 Mt in 2001 from 1.9 Mt in 2000 and accounted for 11% of U.S. production. Nevada ranked third after Oklahoma and Iowa in U.S. gypsum production.

PABCO Gypsum (a division of Pacific Coast Building Products Inc.) in Clark County northeast of Las Vegas mined and processed nearly 1 Mt of ore in 2001. Although processing yields only about 70% by weight gypsum from the ore, the company was still the largest producer in Nevada. PABCO processed most of this gypsum into wallboard in a plant adjacent to the mine but also made plaster.

The Blue Diamond operation of James Hardie Gypsum southwest of Las Vegas in Clark County was the second largest producer at about 576,000 t. In 2001, James Hardie Gypsum agreed to sell 890 hectares of mined-out land near Blue Diamond for $50 million to W.L. Homes (a unit of the United Kingdom-based house builder John Laing PLC). At yearend 2001, James Hardie Gypsum was also negotiating with PBP PLC of the United Kingdom the sale of its U.S. wallboard business, which included the Blue Diamond operation.

USG Corp., the Nation's largest wallboard producer, was the third largest Nevada producer at about 447,000 t. In 2001, USG filed for Chapter 11 bankruptcy protection because of asbestos litigation. The company's operations remained unaffected by the filing. Art Wilson Co. of Arson City shipped about 116,000 t of gypsum and anhydrite in 2001 from the Adams Mine in Lyon County. D.L. Denman Construction Co. mined and sold gypsum from the Pioneer Gypsum Mine east of Las Vegas.

Georgia Pacific Corp., which operated a wallboard plant northeast of Las Vegas at Apex, stopped mining in Nevada in 1995 and has been purchasing gypsum from a mine in St. George, UT. Citing low wallboard prices, Georgia-Pacific shut down a number of plants and cut back production at its remaining plants in 2001.

In 2001, lime production in Nevada decreased by about 9% compared with that of 2000. The Pilot Peak high-calcium lime operation of Graymont Western US, Inc. (formerly Continental Lime, Inc.) near Wendover in Elko County shipped the most lime in 2000 mainly to Nevada gold-mining operations for use in cyanide-solution pH control. The Pilot Peak plant has three kilns with a combined capacity of more than 700,000 t/yr of quicklime and a hydrated lime plant capable of producing 320 metric tons per day.

Chemical Lime Co. produced lime at Apex northeast of Las Vegas. The operation produced high-calcium quicklime used in metallurgical processing, paper manufacturing, and environmental markets. The company also produced dolomitic lime and hydrated high-calcium lime at Apex mainly for use in construction. The Chemical Lime dolomite quarry at Sloan and the lime kilns at its Henderson plant have ceased operation, although the Henderson plant processed hydrated lime in 2001.

In addition to lime, both Graymont and Chemical Lime ship crushed limestone. Other carbonate producers in Nevada are Min-Ad, Inc. and Nutritional Additives Corp., producers of agricultural dolomite near Winnemucca. Both companies had slightly lower production in 2001 compared with that of 2000.

Chemetall Foote Co. (a subsidiary of Chemetall GmbH) produced lithium carbonate, lithium hydroxide monohydrate, and lithium hydroxide anhydrite at Silver Peak in Esmeralda County. The operation is the only lithium producer in the United States; it produced these chemicals from brine that is pumped from beneath Clayton Valley playa and evaporated in nearby ponds.

Production of magnesia from magnesite at Gabbs in Nye County by Premier Chemicals LLC (formerly Premier Services Corp.) increased slightly compared with 2000, probably because the light-burned magnesia produced at Gabbs is not a refractory commodity. Gabbs, which had been part of Premier Refractories Inc., had been acquired by Cookson Group PLC in 1999. In March 2001, Cookson announced the sale of its magnesia chemicals business to Premier Chemicals.

Magnesium minerals have been mined in the Gabbs area since 1937 when magnesia was shipped to Henderson as a raw material for magnesium metal production. From the 1950s to the 1980s, mining and processing was by Basic Industries, an important producer of refractory magnesia. Because of the impact of low-cost Chinese refractory magnesia, production at Gabbs was switched to light-burned (caustic) magnesia. The commodity is mainly marketed for water and sewage treatment under the name Aquamag, a slow-release pH-control product that has had steadily increasing sales since its introduction about 5 years ago. The mine at Gabbs is the only mine in the United States where magnesite is mined and one of only two locations in the United States where brucite is mined.

The global markets for perlite have been strong in recent years, and although Nevada has abundant resources, only small amounts of perlite were produced from two deposits. Wilkin Mining and Trucking Inc. mined perlite from the Tenacity Perlite Mine in Lincoln County. In the past, most of the perlite was shipped as crude; however, the company built a small perlite "popping" plant, the Tenacity Perlite Mill, in Caliente in 1987, and sales in 2001 were almost exclusively of expanded perlite. Eagle-Picher Minerals Inc. produced expanded perlite at its Colado diatomite plant in Pershing County from perlite that was mined at the Popcorn Mine in Churchill County. The perlite was marketed as a filter aid, and plant capacity was reportedly about 8,000 t/yr.

Huck Salt Co. produced 15,700 t of salt in 2001, a 20% increase compared with that of 2000. The salt, mined from a playa in Fourmile Flat southeast of Fallon in Churchill County, was mainly used for deicing roads. Salt has been harvested from this deposit more or less continuously since the 1860s when it was hauled to the mills that processed Comstock silver and gold ore.

Simplot Silica Products in Clark County shipped 671,000 t of silica sand in 2001, an increase from that of 2000. The sand was mined from an open pit in the relatively friable Cretaceous Baseline Sandstone, washed in the pit, and transported via a slurry pipeline to a plant near Overton where it was screened and bagged.

In 2001, Silica LLC submitted a plan of operations to the BLM to mine as much as 80,000 t/yr of quartzite from the Sugar mining claims southwest of Mercury in Nye County. The quartzite is strongly brecciated and fractured and can be mined without blasting. A three-stage screening plant, three storage silos, a bagging silo, and a truck scale are also proposed for this operation, which could employ as many as eight people.

Caithness Operating Co. of Reno, in collaboration with the U.S. Department of Energy, has developed a method of producing 99.9%-pure silica from geothermal fluids and has set up a pilot plant in Nevada to evaluate the process. The company is targeting production of silica products that bring prices in excess of $20 per pound for use in nanoscale materials. Estimated production of such material from a 50-megawatt geothermal powerplant is about 6,000 t/yr.

In 2000, vermiculite deposits in the Gold Butte area of Clark County were explored because they contained high-quality vermiculite and were near potential markets in Southern California. Stansbury Holdings Corp. explored for vermiculite near the Oglebay Norton Mica Peak deposit in 2000. However, the drilling did not intersect vermiculite, and Stansbury concentrated on deposits in Montana, where the company has mining operations. Environmental groups are lobbying for the area that contains the Gold Butte vermiculite deposits to be designated as wilderness.

Ash Meadows Zeolite LLC (a subsidiary of Badger Mining Corp.) shipped 1,000 to 2,000 t/yr of clinoptilolite from a plant in Amargosa Valley in Nye County; this facility was formerly owned by American Resource Corp. The clinoptilolite, which was used in water filtration, odor control, and nuclear cleanup, was mined from a large deposit in California that extended into Nevada. The company was evaluating plans for mining green clinoptilolite for use in cat litter from the Nevada portion of the deposit. In 2001, Moltan mined no mordenite from its zeolite deposit in the Trinity Range in Churchill County. The company, however, shipped some stockpiled mordenite from its Fernley absorbents and cat litter plant.

Mineral exploration in Nevada continued to decline in 2001. Newmont and Barrick carried out property exploration and development along the Carlin trend, with emphasis being placed on underground targets, and Placer Dome continued exploration at its Crossroads and Pediment deposits in the Bullion and Cortez districts of Lander and Eureka Counties. In 2001, very little exploration within Nevada was aimed at targets other than gold and silver; however, early in the year, some exploration activity was reported for platinum-group elements in the Bunkerville district of Clark County, and a gallium play in the Opalite district of Humboldt County received attention in the press.

Reference Cited

Tingley, J.V., and La Pointe, D.D., 2002, Nevada, *in* Annual review 2001: Mining Engineering, v. 54, no. 5, May, p. 68-72.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN NEVADA 1 2

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral		1999		2000		2001 p/	
		Quantity	Value	Quantity	Value	Quantity	Value
Clays:							
Bentonite		6	W	6	804	6	800
Fuller's earth		25	3,580	28	3,870	27	3,800
Gemstones		NA	205	NA	W	NA	W
Gold 3	kilograms	256,000	2,310,000	268,000	2,410,000	264,000	2,380,000
Sand and gravel:							
Construction		31,700	142,000	36,800	172,000	33,100	157,000
Industrial		W	W	609	W	621	W
Silver 3	metric tons	597	101,000	633	102,000	612	98,300
Stone, crushed		7,090	37,900	7,640	37,300	8,400	42,200
Zeolites	metric tons	--	--	(4)	NA	(4/)	NA
Combined values of barite, brucite, cement (portland), clays (kaolin), copper, diatomite, gypsum (crude), iron ore [usable (1999)], lead (2000-01), lime, lithium minerals, magnesite, mercury (1999-2000), perlite (crude), salt, and values indicated by symbol W		XX	286,000	XX	250,000 r/	XX	247,000
Total		XX	2,880,000	XX	2,980,000 r/	XX	2,930,000

p Preliminary. r Revised. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined values" data. XX Not applicable. Zero.

1 Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2 Data are rounded to no more than three significant digits; may not add to totals shown.

3 Recoverable content from ores, etc.

4 Withheld to avoid disclosing company proprietary data.

TABLE 2
NEVADA: CRUSHED STONE SOLD OR USED, BY KIND 1

Kind	1999				2000			
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone	6	4,690	$17,400	$3.71	4	4,800	$18,900	$3.93
Dolomite	3	W	W	82.13	4	W	W	33.11
Granite	1	W	W	5.24	1	W	W	3.58
Traprock	2	118	456	3.86	14	93	419	4.51
Volcanic cinder and scoria	2	W	W	4.58	2	W	W	5.11
Miscellaneous stone	4	1,330	10,300	7.75	4	1,390	10,800	7.77
Total or average	XX	7,090	37,900	5.34	XX	7,640	37,300	4.88

W Withheld to avoid disclosing company proprietary data; included in "Total." XX Not applicable.

1 Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

TABLE 3
NEVADA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+1 1/2 inch):			
Riprap and jetty stone	W	W	$4.71
Filter stone	W	W	3.38
Coarse aggregate, graded:			
Concrete aggregate, coarse	W	W	14.61
Other graded coarse aggregate	W	W	3.39
Fine aggregate (-3/8 inch), stone sand, concrete	W	W	3.74
Coarse and fine aggregates:			
Graded road base or subbase	W	W	3.56
Unpaved road surfacing	W	W	3.59
Crusher run or fill or waste	83	$380	4.58
Other coarse and fine aggregates	W	W	3.58
Agricultural:			
Agricultural limestone	W	W	33.18
Other agricultural uses	W	W	31.67
Chemical and metallurgical:			
Cement manufacture	W	W	4.16
Lime manufacture	W	W	3.81
Sulfur oxide removal	W	W	4.24
Other miscellaneous uses and specified not listed	W	W	5.36
Unspecified: 3/			
Reported	1,210	6,360	5.24
Estimated	1,900	5,700	3.06
Total or average	3,070	12,000	3.91
Grand total or average	7,640	37,300	4.88

W Withheld to avoid disclosing company proprietary data; included in "Grand total."

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Includes dolomite, granite, limestone, miscellaneous stone, traprock, and volcanic cinder and scoria.

3/ Reported and estimated production without a breakdown by end use.

TABLE 4
NEVADA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

Use	District 1		District 2	
	Quantity	Value	Quantity	Value
Construction:				
Coarse aggregate (+1 1/2 inch) 2/	W	W	--	--
Coarse aggregate, graded 3/	W	W	W	W
Fine aggregate (-3/8 inch) 4/	W	W	W	W
Coarse and fine aggregate 5/	W	W	W	W
Agricultural 6/	W	W	--	--
Chemical and metallurgical 7/	W	W	W	W
Other miscellaneous uses 8/	W	W	W	W
Unspecified: 9/				
Reported	1,210	6,360	--	--
Estimated	--	--	1,900	5,700
Total	3,020	15,600	4,620	21,700

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes filter stone, and riprap and jetty stone.

3/ Includes concrete aggregate (coarse) and other graded coarse aggregate.

4/ Includes stone sand (concrete).

5/ Includes crusher run (select material or fill), graded road base or subbase, unpaved road surfacing, and other coarse and fine aggregates.

6/ Includes agricultural limestone and other agricultural uses.

7/ Includes cement manufacture, lime manufacture, and sulfur oxide removal.

8/ Includes specified uses not listed.

9/ Reported and estimated production without a breakdown by end use.

TABLE 5
NEVADA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregates (including concrete sand) 2/	6,320	$36,200	$5.73
Concrete products (blocks, bricks, pipe, decorative, etc.)	445	4,210	9.45
Asphaltic concrete aggregates and other bituminous mixtures	1,740	15,000	8.67
Road base and coverings 3/	5,570	23,600	4.24
Fill	1,870	7,180	3.85
Snow and ice control	54	274	5.07
Other miscellaneous uses 4/	962	3,330	3.47
Unspecified: 5/			
Reported	11,200	39,600	3.55
Estimated	8,700	42,000	4.88
Total or average	36,800	172,000	4.67

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes plaster and gunite sands.

3/ Includes road and other stabilization (cement).

4/ Includes railroad ballast.

5/ Reported and estimated production without a breakdown by end use.

TABLE 6
NEVADA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

	District 1		District 2		Unspecified districts	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products 2/	1,830	9,630	4,920	30,700	10	62
Asphaltic concrete aggregates and other bituminous mixtures	1,240	9,730	493	5,310	--	--
Road base and coverings 3/	888	4,680	4,680	18,900	1	4
Fill	743	2,710	1,110	4,380	15	93
Other miscellaneous uses 4/	58	367	955	3,210	5	30
Unspecified: 5/						
Reported	225	963	6,530	31,300	4,400	7,280
Estimated	2,200	8,500	6,500	34,000	--	--
Total	7,170	36,600	25,200	128,000	4,430	7,470

-- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

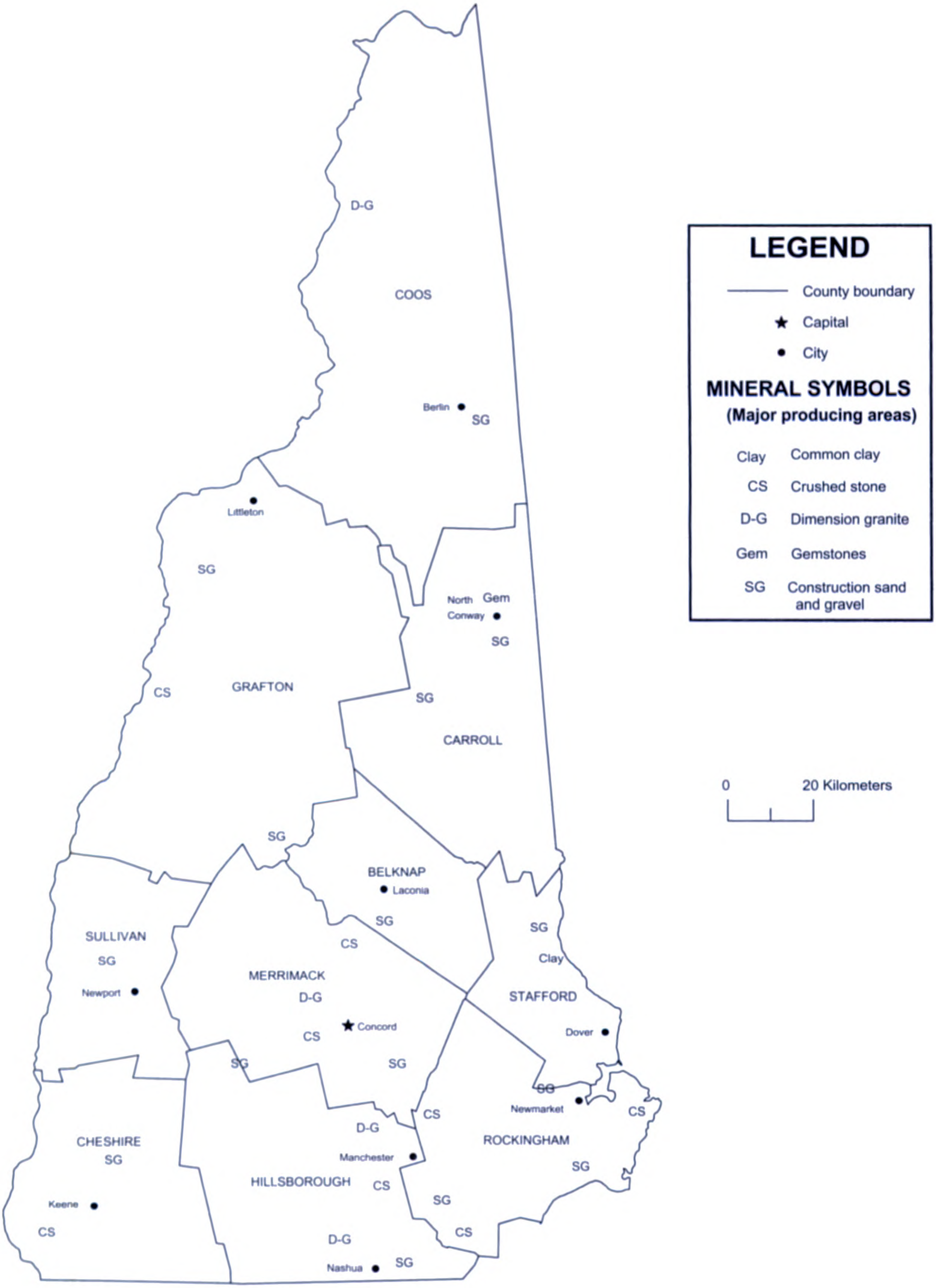
2/ Includes plaster and gunite sands.

3/ Includes road and other stabilization (cement).

4/ Includes railroad ballast and snow and ice control.

5/ Reported and estimated production without a breakdown by end use.

NEW HAMPSHIRE



Source: New Hampshire Geological Survey/U.S. Geological Survey (2001)

THE MINERAL INDUSTRY OF NEW HAMPSHIRE

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the New Hampshire Department of Environmental Services for collecting information on all nonfuel minerals.

In 2001, the estimated value[1] of nonfuel mineral production for New Hampshire was about $60 million, based upon preliminary U.S. Geological Survey (USGS) data. This was about a 5.5% increase from that of 2000[2] and followed an 1.2% increase from 1999 to 2000. Because data for crushed sandstone and dimension granite have been withheld to protect company proprietary data, the actual total values for 1999-2001 are higher than (while following the same trend as) those reported in table 1.

Construction sand and gravel, a high-volume, low-value mineral commodity, remained New Hampshire's leading nonfuel mineral commodity in 2001, accounting for about 75% of its nonfuel mineral value. Crushed stone was the State's second leading nonfuel mineral (table 1). In 2001, dimension granite showed a 7% increase in production with a 5% increase in its value since 1999; crushed sandstone production and value also were up, about 160% and 70%, respectively. In 2000, the $4.7 million increase in the value of construction sand and gravel more than offset the decrease in crushed stone resulting in the small net gain for the year (table 1). Dimension granite production was up, whereas its value was down slightly; the production of crushed sandstone more than doubled, while its value was up about 50%.

The following narrative information was provided by the New Hampshire Geological Survey[3] (NHGS). The NHGS was established on August 18, 2001. The statute that created the Survey states that "The New Hampshire Geological Survey shall collect data and perform research on the land, mineral, and water resources of the state, and disseminate the findings of such research to the public through maps, reports, and other publications" (New Hampshire Department of Environmental Services, 2001). Establishment of a State geological survey allows New Hampshire to be more competitive for grants (for example, the USGS Cooperative Statemap Program), coordinate geologic mapping projects through one central State office, and provide one central data collection agency for water well records and data. The NHGS also serves as a geological science research and information agency for State government, as well as the private sector.

Since 1984, water well drillers have been required to report depth to bedrock as part of the well report that they submit to the New Hampshire Department of Environmental Services (NHDES). The NHGS, which is a unit of the NHDES, is the repository for these reports. These data are used to provide useful subsurface data for resource evaluation, and the "depth to bedrock" information is especially valuable for estimating the thickness of deposits in the surficial geologic mapping program.

During 2001, minerals of gem quality continued to be found in New Hampshire by amateur mineral collectors and mineral clubs. Garnet, topaz, amethyst, epidote, smoky quartz, fluorite, and beryl were discovered and collected. A small quantity of muscovite continues to be mined for resale by educational science supply houses.

The demand for aggregate is steady, but growing less than in the past. Overall, permitted reserves are dwindling because many small producers are consuming their reserves but finding difficulty obtaining new permits for expansion because of land "sterilization" from growth or other land-use restrictions. Four or five major producers, mainly because of their large permitted reserves, are currently meeting most of the State and regional demand. In 2001, New Hampshire aggregate production was used for asphalt and concrete, stone for riprap and drainage, roadway subgrade material, and general construction products.

Quality deposits of sand and gravel continue to be in high demand. Thus, most operations find processing (crushing and screening) necessary to meet the wide variety of specifications. The "big dig," Boston's relocation of Interstate-93 (I-93) through the downtown area, continues to consume large quantities of sand from the Ossipee region.

Approximately 14% of New Hampshire land area is covered by stratified-drift deposits. The majority of these deposits are located mainly in stream valleys and lowlands. Because of New Hampshire's rugged topography, most urban centers, commercial/industrial parks, and transportation corridors are also located in valleys underlain by stratified drift. These land-use patterns often limit access to quality sand and gravel deposits or limit recharge to stratified-drift aquifers that typically provide major water supplies. Increasingly, "valley conflicts" arise between the demand for water supplies and the need for sand and gravel or space for urban growth.

In 2001, there were no significant commercial clay operations. Nonprocessed clay is currently (2001) an ondemand resource and locally supplied as needed (used for the base of landfills, ponds, and the core of dams).

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[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2001 USGS mineral production data published in this chapter are preliminary estimates as of August 2002 and are expected to change. For some mineral commodities, such as construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Specialist contact information may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals/contacts/comdir.html; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2] Values, percentage calculations, and rankings for 2000 may differ from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also change.

[3] Lee Wilder, Public Outreach Coordinator for the New Hampshire Geological Survey, authored the text of State mineral industry information provided by that agency.

The John Swenson Granite Works in Concord and the Fletcher Granite Co. in Milford continue to be the State's largest producers of dimension stone. Both quarries mine the Concord gray, two-mica granite. The demand is strong and growing, with most of the cut stone being used for curbing. The Granite State has at least two other smaller, independent operations, also quarrying the Concord granite, which is used mostly for landscaping stone.

The Swenson Pink Quarry in Columbia quarries a pink granite on an ondemand basis. In 2001, demand for pink granite from this quarry was met with previously quarried stone.

The NHGS offers a number of publications on the bedrock, surficial geology, and ground water resources of New Hampshire. Publications can be obtained by contacting the Public Information Center of the Department of Environmental Services. A current listing of available publications is available on the Internet at URL http://www.des.state.nh.us/geo1link.htm#Maps.

The NHGS continues to be active in the STATEMAP and EDMAP programs, components of the USGS National Cooperative Geologic Mapping Program. Under STATEMAP 2002, the surficial geology of the New Boston, Enfield, and Northfield quadrangles are scheduled to be mapped at the 1:24,000-scale.

Four EDMAP projects (designed for training future geologic cartographers) were recently completed by students and their faculty mentors from the University of New Hampshire; they mapped the bedrock geology of the 1:24,000-scale Candia, Epping, Exeter, and Hampton quadrangles. Bedrock geology mapping is also being conducted in the Lake Sunapee region by researchers from Keene State University.

Reference Cited

New Hampshire Department of Environmental Services, 2001, New Hampshire celebrates earth science week and the creation of the N.H. Geological Survey: Concord, NH, New Hampshire Department of Environmental Services press release, October 8, 2 p.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN NEW HAMPSHIRE 1/ 2/

(Thousand metric tons and thousand dollars)

	1999		2000		2001 p/	
Mineral	Quantity	Value	Quantity	Value	Quantity	Value
Gemstones	NA	6	NA	6	NA	6
Sand and gravel, construction	7,950	36,700	8,660	41,400	9,500	46,100
Stone, crushed 3/	4,290	19,700	3,740	15,700	3,300	14,200
Combined values of stone (crushed sandstone and dimension granite)	XX	(4/)	XX	(4/)	XX	(4/)
Total	XX	56,400	XX	57,100	XX	60,300

p/ Preliminary. NA Not available. XX Not applicable.
1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).
2/ Data are rounded to no more than three significant digits; may not add to totals shown.
3/ Excludes certain stones, values that must be concealed to avoid disclosing company proprietary data.
4/ Value excluded to avoid disclosing company proprietary data.

TABLE 2
NEW HAMPSHIRE: CRUSHED STONE SOLD OR USED, BY KIND 1/

	1999				2000			
Kind	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Granite	10	2,590	$9,530	$3.69	10	1,820	$7,200	$3.95
Sandstone	1	(2/)	(2/)	(2/)	1	(2/)	(2/)	(2/)
Traprock	7	1,700	10,100	5.96	7	1,920	8,460	4.41
Total or average	XX	4,290	19,700	4.59	XX	3,740	15,700	4.19

XX Not applicable.
1/ Data are rounded to no more than three significant digits; may not add to totals shown.
2/ Withheld from total to avoid disclosing company proprietary data.

TABLE 3
NEW HAMPSHIRE: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+1 1/2 inch):			
Macadam	W	W	$4.44
Riprap and jetty stone	W	W	4.64
Filter stone	W	W	4.60
Coarse aggregates graded:			
Concrete aggregate, coarse	(3/)	(3/)	4.44
Bituminous aggregate, coarse	(3/)	(3/)	4.41
Other graded coarse aggregate	207	$911	4.40
Fine aggregate (-3/8 inch):			
Stone sand, concrete	W	W	4.39
Stone sand, bituminous mix or seal	W	W	4.38
Screening, undesignated	W	W	4.40
Coarse and fine aggregates:			
Graded road base or subbase	(3/)	(3/)	4.47
Crusher run or fill or waste	(3/)	(3/)	4.42
Other coarse and fine aggregates	139	613	4.41
Unspecified: 4/			
Reported	1,880	8,300	4.41
Estimated	1,300	5,000	3.78
Total or average	3,220	13,300	4.15
Grand total or average	3,740	15,700	4.19

W Withheld to avoid disclosing company proprietary data; included in "Grand total."

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes granite and traprock; excludes sandstone from total to avoid disclosing company proprietary data.

3/ Withheld to avoid disclosing company proprietary data; included with "Other."

4/ Reported and estimated production without a breakdown by end use.

TABLE 4
NEW HAMPSHIRE: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY MAJOR USE CATEGORY 1/

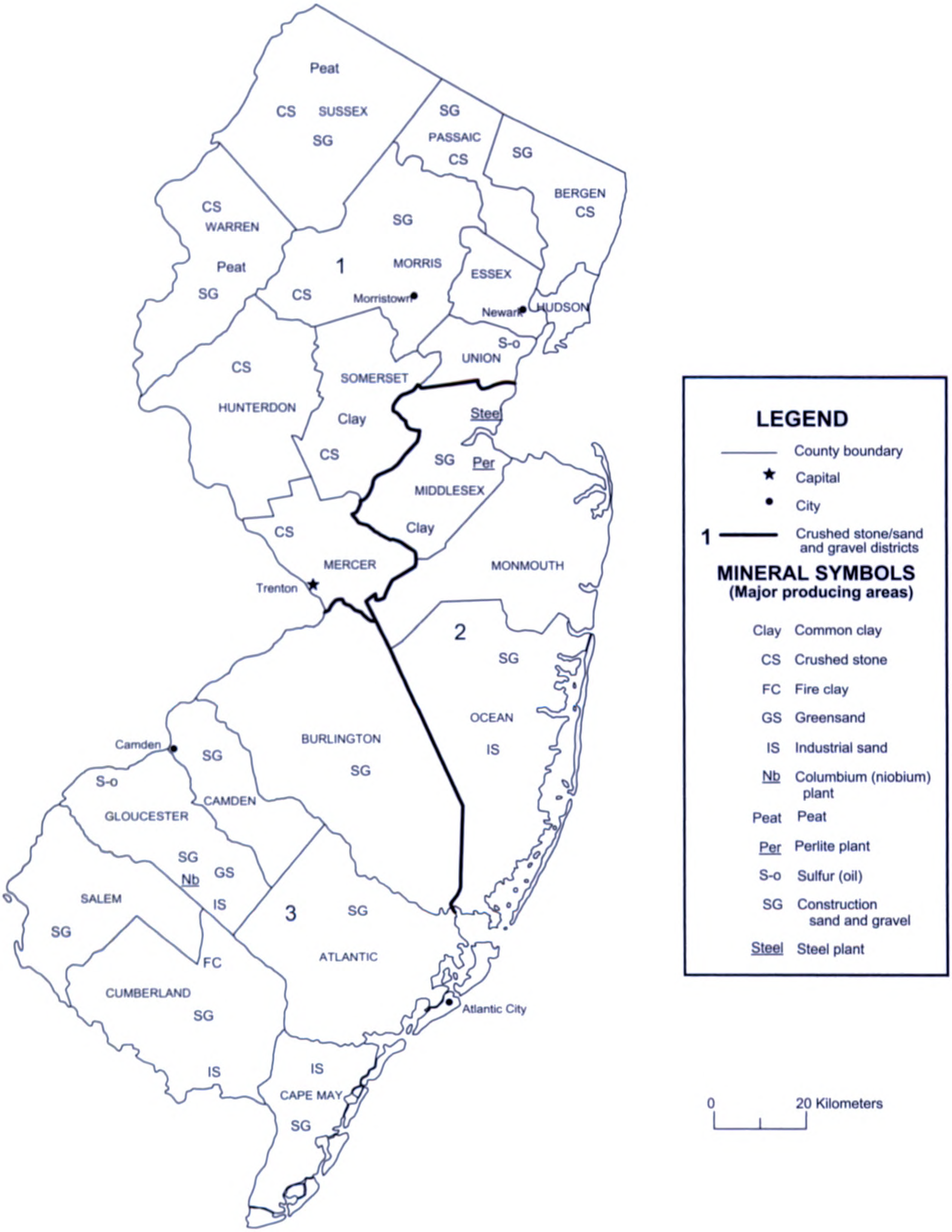
Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate and concrete products	1,510	$7,670	$5.07
Asphaltic concrete aggregates and other bituminous mixtures	494	2,500	5.06
Road base and coverings	863	3,920	4.54
Fill	983	3,340	3.40
Snow and ice control	110	482	4.38
Railroad ballast	140	1,000	7.14
Roofing granules	2	7	3.50
Other miscellaneous uses 2/	135	532	3.94
Unspecified: 3/			
Reported	1,870	9,160	4.89
Estimated	2,500	13,000	5.04
Total or average	8,660	41,400	4.78

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes filtration.

3/ Reported and estimated production without a breakdown by end use.

NEW JERSEY



Source: New Jersey Geological Survey/U.S. Geological Survey (2001)

THE MINERAL INDUSTRY OF NEW JERSEY

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the New Jersey Geological Survey for collecting information on all nonfuel minerals.

In 2001, the estimated value[1] of nonfuel mineral production for New Jersey was $348 million, based upon preliminary U.S. Geological Survey (USGS) data. This was up nearly 20% from that of 2000[2] and followed a 1.4% increase from 1999 to 2000.

Crushed stone and construction sand and gravel, by value, were New Jersey's leading nonfuel mineral commodities. In 2001, increases in the values of crushed stone, construction sand and gravel, and greensand marl led the State's rise in nonfuel raw mineral production value (descending order of change) (table 1). All other changes were small and had little effect on the State's overall gain. In 2000, a $10 million increase in crushed stone and a $3.6 million rise in industrial sand and gravel more than offset decreases in construction sand and gravel and greensand marl, resulting in the State's increase for the year.

Based upon USGS estimates of the quantities of minerals produced in the United States in 2001, New Jersey continued to be the only State to produce greensand marl and was sixth in the production of industrial sand and gravel. Greensand marl is used directly as an organic conditioner and fertilizer for soils and as a water filtration medium to remove soluble iron and manganese from well water. Additionally, significant quantities of construction sand and gravel and crushed stone were produced in the State.

The following narrative information was provided by the New Jersey Geological Survey[3] (NJGS). Most of New Jersey's nonfuel mineral mining activities continued to center around the production of crushed stone, construction sand and gravel, and industrial sand and gravel, and to a lesser extent, clay, greensand marl, and peat. Gemstones also were mined, but these were mainly collected on a small scale by hobbyists. Although some interest continued to be expressed in heavy-mineral placer mining in 2001, no mining activity, onshore or offshore, of any significance was reported during the year.

Some merger and takeover activity took place during 2001. The Hamburg Quarry, owned by Lafarge, Inc., was purchased by Eastern Concrete, a subsidiary of U.S. Concrete. Cemex, Inc. purchased the Southdown, Inc. Mine in Sparta, NJ. The Mount Hope Mine was purchased by Tilcon NY/NJ, Inc. of Millington, NJ. And lastly, Stavola Construction Materials, Inc. of Red Bank, NJ, purchased the Oldwick Quarry.

Various large-scale capital projects and strong private-sector activity during the year continued to contribute to the State's active construction sector. Major road widening and realignment projects, light rail line construction, and continued rapid growth associated with Atlantic City and its casino gambling industry also fueled the demand for industrial minerals. Work on the 4-kilometer (km), $330 million Atlantic City-Brigantine Connector Tunnel and Roadway Project was completed in 2001, opening up the Atlantic City's Marina District to increased casino growth. The connector includes 11 bridges and a 640-meter tunnel moving traffic through a residential area, under U.S. Route 30, and overall linking the Atlantic City Expressway with the city's Marina District. This project alone used about 612,000 cubic meters of specified structural fill (sand and gravel containing minimal amounts of fine grains), almost 22,000 linear meters of permanent pilings, 116,000 cubic yards of structural concrete, and more than 67,000 metric tons of asphalt pavement.

The Route 29 tunnel project in Trenton, the State capital, was also completed during the year, requiring 57,400 cubic meters of concrete.

Exploration and Government Activities

Sand and gravel exploration and development continued to be an area of particular interest in the State. Most new exploration interest has centered on the offshore area along New Jersey's Atlantic Coast. The U.S. Department of the Interior's Minerals Management Service (MMS) proposed its first sand and gravel sale (1999) from an approximately 175-square-kilometer site, about 5 to 19 km off the New Jersey coast in Federal Government waters of the Atlantic Ocean. The site, located east of Monmouth County from slightly north of Long Branch south to slightly south of Belmar, continued to be under evaluation during 2001. Development of these offshore sand and gravel resources remained a topic of much interest and discussion during the year. Mining industry representatives offered to help pay for beach restoration and for capping of the Historic Area Remediation Site (HARS) in exchange for permission to mine sand from the ocean floor off Monmouth County. No decisions have yet been made concerning the development of these resources. Currently offshore mining remains limited to the sand derived from the maintenance dredging of the Ambrose Shipping Channel and to limited evaluation dredging in the Sandy Hook Shipping Channel in Raritan Bay.

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[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2001 USGS mineral production data published in this chapter are preliminary estimates as of August 2002 and are expected to change. For some mineral commodities, such as construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Specialist contact information may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals/contacts/comdir.html; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2] Values, percentage calculations, and rankings for 2000 may differ from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also change.

[3] Lloyd Mullikin, Supervising Geologist, authored the text of the State mineral industry information provided by the New Jersey Geological Survey.

The U.S. Army Corps of Engineers and the New Jersey Department of Environmental Protection (NJDEP) commitment to long-term beach replenishment projects along the Atlantic Coast continued. The New Jersey Geological Survey, an agency of the NJDEP, in cooperation with the MMS continued to locate and document offshore sand occurrences by conducting geophysical surveys and by collecting vibra-core samples about 3 to 10 kilometers off shore in both State and Federal waters.

Local ordinances restricting mining activity have resulted in the effective loss of mining reserves. Owing to the increasing demand for, juxtaposed with increasing difficulties experienced in developing new mining properties, older active and inactive mining properties are being revisited in order to determine their potential for reopening or increasing development. No new land-based mining operations of any significance started up during 2001.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN NEW JERSEY 1/ 2/

(Thousand metric tons and thousand dollars)

Mineral	1999 Quantity	1999 Value	2000 Quantity	2000 Value	2001 p/ Quantity	2001 p/ Value
Clays, common	W	W	W	130	W	130
Gemstones	NA	1	NA	1	NA	1
Sand and gravel:						
Construction	16,500	91,500	16,300	85,000	17,900	94,800
Industrial	1,580	32,100	1,690	35,700	1,690	35,500
Stone, crushed	24,500	160,000	24,900	170,000	31,000	218,000
Combined values of greensand marl, peat, and value indicated by symbol W	XX	3,200	XX	(3/)	XX	(3/)
Total	XX	287,000	XX	291,000	XX	348,000

p/ Preliminary. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined values" data. XX Not applicable.

1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/ Data are rounded to no more than three significant digits; may not add to totals shown.

3/ Value excluded to avoid disclosing company proprietary data.

TABLE 2
NEW JERSEY: CRUSHED STONE SOLD OR USED, BY KIND 1/

Kind	1999 Number of quarries	1999 Quantity (thousand metric tons)	1999 Value (thousands)	1999 Unit value	2000 Number of quarries	2000 Quantity (thousand metric tons)	2000 Value (thousands)	2000 Unit value
Limestone	2 r/	W	W	W	1	W	W	W
Granite	11	10,500	$58,200	$5.54	11	10,000	$59,700	$5.97
Traprock	12	13,600	97,100	7.15	12	14,200	102,000	7.19
Miscellaneous stone	1	W	W	W	1	W	W	W
Total or average	XX	24,500	160,000	6.54	XX	24,900	170,000	6.82

r/ Revised. W Withheld to avoid disclosing company proprietary data; included in "Total." XX Not applicable.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 3
NEW JERSEY: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+1 1/2 inch):			
Riprap and jetty stone	61	$457	$7.49
Other coarse aggregate	98	332	3.39
Total or average	159	789	4.96
Coarse aggregate, graded:			
Concrete aggregate, coarse	610	3,110	5.10
Bituminous aggregate, coarse	W	W	3.79
Other graded coarse aggregate	1,490	11,900	7.95
Total or average	2,100	15,000	7.12
Fine aggregate (-3/8 inch):			
Stone sand, concrete	237	1,490	6.30
Stone sand, bituminous mix or seal	W	W	3.79
Screening, undesignated	1,120	7,940	7.06
Other fine aggregate	92	642	6.98
Total or average	1,450	10,100	6.93
Coarse and fine aggregates:			
Graded road base or subbase	566	3,340	5.91
Terrazzo and exposed aggregate	109	1,000	9.17
Crusher run or fill or waste	W	W	7.73
Roofing granules	W	W	21.99
Other coarse and fine aggregates	4,810	40,700	8.48
Total or average	5,480	45,100	8.22
Other construction materials	3,570	24,400	6.85
Agricultural:			
Agricultural limestone	(3/)	(3/)	33.33
Poultry grit and mineral food	(3/)	(3/)	33.00
Chemical and metallurgical, flux stone	(4/)	(4/)	(4/)
Special:			
Mine dusting or acid water treatment	(3/)	(3/)	8.00
Asphalt fillers or extenders	(3/)	(3/)	8.00
Whiting or whiting substitute	(3/)	(3/)	14.29
Other fillers or extenders	(3/)	(3/)	12.50
Unspecified: 5/			
Reported	5,780	32,700	5.66
Estimated	6,300	40,000	6.30
Total or average	12,100	72,200	5.99
Grand total or average	24,900	170,000	6.82

W Withheld to avoid disclosing company proprietary data; included with "Other."

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Includes granite, limestone, miscellaneous stone, and traprock.

3/ Withheld to avoid disclosing company proprietary data; included in "Grand total."

4/ Less than ½ unit.

5/ Reported and estimated production without a breakdown by end use.

TABLE 4
NEW JERSEY: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE AND DISTRICT 1/ 2/

(Thousand metric tons and thousand dollars)

Use	District 1		District 3	
	Quantity	Value	Quantity	Value
Construction:				
Coarse aggregate (+1 1/2 inch) 3/	158	789	--	--
Coarse aggregate, graded 4/	2,100	15,000	--	--
Fine aggregate (-3/8 inch) 5/	1,450	10,100	--	--
Coarse and fine aggregate 6/	5,480	45,100	--	--
Other construction materials	3,570	24,400	--	--
Agricultural 7/	W	W	--	--
Chemical and metallurgical 8/	(9/)	(9/)	--	--
Special 10/	W	W	--	--
Unspecified: 11/				
Reported	5,710	32,200	73	461
Estimated	6,300	40,000	--	--
Total	24,800	169,000	73	461

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ No production reported for District 2.

3/ Includes riprap and jetty stone and other coarse aggregate.

4/ Includes bituminous aggregate (coarse), concrete aggregate (coarse), and other graded coarse aggregate.

5/ Includes screening (undesignated), stone sand (bituminous mix or seal), stone sand (concrete), and other fine aggregate.

6/ Includes crusher run (select or material use), graded roadbase or subbase, roofing granules, terrazzo and exposed aggregate, and other coarse and fine aggregates.

7/ Includes agricultural limestone and poultry grit and mineral food.

8/ Includes flux stone.

9/ Less than ½ unit.

10/ Includes asphalt fillers or extenders, mine dusting or acid water treatment, whiting or whiting substitute, and other fillers or extenders.

11/ Reported and estimated production without a breakdown by end use.

TABLE 5
NEW JERSEY: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	4,640	$21,200	$4.56
Plaster and gunite sands	157	1,010	6.43
Concrete products (blocks, bricks, pipe, decorative, etc.)	749	4,930	6.58
Asphaltic concrete aggregates and other bituminous mixtures	1,590	10,200	6.47
Road base and coverings	702	2,080	2.96
Fill	522	1,780	3.41
Snow and ice control	107	525	4.91
Other miscellaneous uses 2/	169	1,550	9.15
Unspecified: 3/			
Reported	3,410	20,500	6.03
Estimated	4,300	21,000	4.98
Total or average	16,300	85,000	5.22

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes filtration and railroad ballast.

3/ Reported and estimated production without a breakdown by end use.

TABLE 6
NEW JERSEY: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate (including concrete sand)	902	5,280	2,220	9,280	1,520	6,600
Concrete products (blocks, bricks, pipe, decorative, etc.) 2/	169	1,480	630	3,800	108	663
Asphaltic concrete aggregates and road base materials	1,150	6,870	996	5,000	138	454
Fill	158	726	W	W	W	W
Other miscellaneous uses 3/	207	1,410	118	340	314	1,370
Unspecified: 4/						
Reported	48	274	1,860	11,500	1,500	8,800
Estimated	1,000	5,900	1,000	4,900	2,200	10,000
Total	3,640	22,000	6,830	34,800	5,820	28,300

W Withheld to avoid disclosing company proprietary data; included with "Other miscellaneous uses."

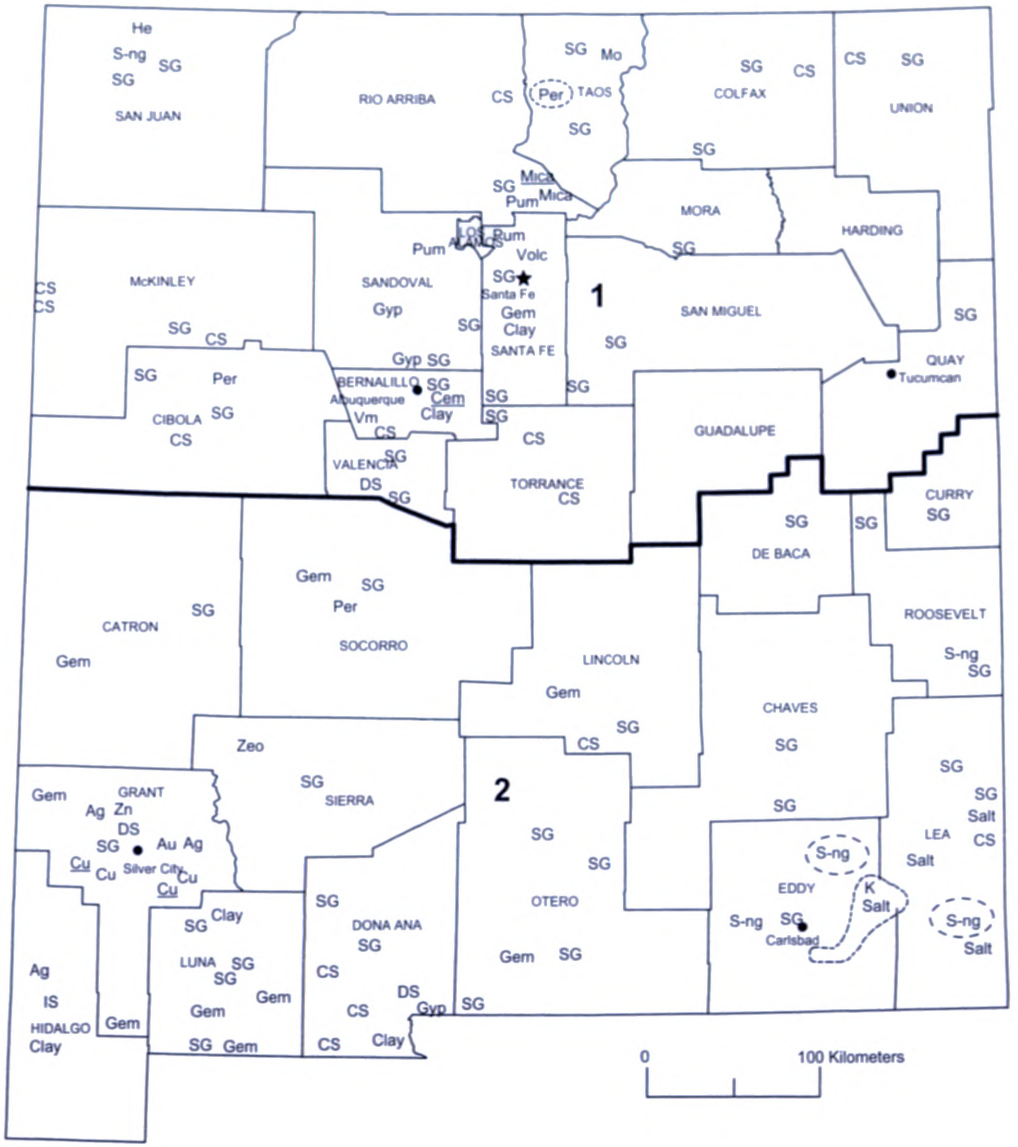
1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes plaster and gunite sands.

3/ Includes filtration and railroad ballast and snow and ice control.

4/ Reported and estimated production without a breakdown by end use.

NEW MEXICO



LEGEND

County boundary
★ Capital
● City
1 Crushed stone/sand and gravel districts

MINERAL SYMBOLS (Major producing areas)

Ag	Silver
Au	Gold
Cem	Cement plant
Clay	Common clay
CS	Crushed stone
Cu	Copper
Cu	Copper plant
DS	Dimension stone
Gem	Gemstones
Gyp	Gypsum
He	Helium
IS	Industrial sand
K	Potash
Mica	Mica
Mica	Mica plant
Mo	Molybdenum
Per	Perlite
Pum	Pumice
S-ng	Sulfur (natural gas)
Salt	Salt
SG	Construction sand and gravel
Vm	Vermiculite
Volc	Volcanic cinder
Zeo	Zeolites
Zn	Zinc
	Concentration of mineral operations

Source: New Mexico Bureau of Mines and Mineral Resources/U.S. Geological Survey (2001)

THE MINERAL INDUSTRY OF NEW MEXICO

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the New Mexico Bureau of Mines and Mineral Resources for collecting information on all nonfuel minerals.

In 2001, the estimated value[1] of nonfuel mineral production for New Mexico was $614 million, based upon preliminary U.S. Geological Survey (USGS) data. This was a 22% decrease from that of 2000[2] and followed a 9.3% increase from 1999 to 2000. The State was 24th in rank (18th in 2000) among the 50 States in total nonfuel mineral production value and accounted for about 1.5% of the U.S. total.

The top nonfuel minerals in New Mexico were, by value, copper and potash, followed by construction sand and gravel and cement (portland and masonry). These four accounted for about 88% of the State's total nonfuel raw mineral production value. In 2001, decreases in copper, down about $145 million, and potash, down about $25 million, accounted for the largest portion of the State's decrease in value. Smaller yet significant decreases also existed in construction sand and gravel, mica, gold (down more than $3.5 million), portland cement, molybdenum concentrates, perlite (down about $2.5 million), and gypsum (descending order of change) (table 1). Relatively small increases surfaced in the values of crushed stone, salt, pumice and pumicite, and lime. In 2000, increases in the values of copper (up $50 million), construction sand and gravel and potash (up about $14 million each), and lime led the State's increase in value for the year. The most significant decreases were those of molybdenum, portland cement, gold, and perlite, in a range from about $7 million down to about $1.5 million (table 1).

Based upon USGS estimates of the quantities of minerals produced in the 50 States during 2001, New Mexico was first in the Nation in potash, perlite, and zeolites, third in copper, and fifth in molybdenum. The State rose to second from third in pumice and pumicite, decreased to third from second in mica, and was a significant producer of construction sand and gravel and dimension stone (production listings by descending order of value).

The following narrative information was provided by the New Mexico Bureau of Mines and Mineral Resources[3] (BMMR). Production data in the text that follows are those reported by the BMMR and are based on the agency's own surveys and estimates. They may differ from some production figures reported to the USGS.

Copper prices continued to drop in 2001 after layoffs, cutbacks, and mine closures. Commodity exchange (COMEX) spot prices averaged $0.76 per pound in 1999, $0.89 per pound in 2000, and $0.73 per pound in 2001.

The largest porphyry copper deposit in New Mexico was Phelps Dodge Corp.'s Chino Mine at Santa Rita. In 2001, Chino produced 16,600 metric tons (t) of copper in concentrates and precipitates and 54,300 t of copper by solvent extraction-electrowinning (SX-EW) process (Phelps Dodge Corp., 2002§[4], p. 7). Estimated milling reserves in 2001 were 275 million metric tons (Mt) of 0.59% copper, and estimated leaching reserves were 407 Mt of 0.28% copper (Phelps Dodge Corp., 2002§, p. 12). The company developed a first-of-its-kind control system to guide the processing of the wide variety of ore found in the Chino deposit. The system saves costs by analyzing the ore as it comes into the concentrator and continually adjusts ore processing conditions.

Phelps Dodge's Tyrone porphyry copper mine in the Burro Mountains produced 69,300 t of electrowon copper (Phelps Dodge Corp., 2002§, p. 7). The concentrator processed approximately 272 Mt of ore grading 0.81% copper from 1969 to 1992. The mill closed and the mine began mining for leach. In 2001, leaching reserves were estimated to be 394 Mt of ore grading 0.3% copper (Phelps Dodge Corp., 2002§, p. 12). In addition, the Niagara deposit contains 450 Mt of mineralized material grading 0.29% copper as of December 2001. According to Phelps Dodge, this mineralized material could be brought into production should market conditions warrant.

In 1998, Phelps Dodge acquired Cobre Mining Co., Inc.'s operations, which include an open pit mine, two underground mines, two mills, and surrounding 4,450 hectares (ha) of land. By March 1999, all operations were suspended; the operation remained on care-and-maintenance status in 2001. Estimated milling reserves in 2001 were 120 Mt of ore grading 0.73% copper, and leaching reserves were 89 Mt of ore grading 0.35% copper (Phelps Dodge Corp., 2002§, p. 12).

Molybdenum was produced from Molycorp Inc.'s Questa Mine in Taos County. Molycorp (a subsidiary of Unocal Corp.) processed 649,000 t of crude ore in 2001 that resulted in 1,240 t of molybdenum disulfide (MoS_2) in concentrate recovered. In

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[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2001 USGS mineral production data published in this chapter are preliminary estimates as of August 2002 and are expected to change. For some mineral commodities, such as construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Specialist contact information may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals/contacts/comdir.html; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2] Values, percentage calculations, and rankings for 2000 may differ from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also change.

[3] Virginia T. McLemore, Senior Economic Geologist, authored the State mineral industry information provided by the New Mexico Bureau of Mines and Mineral Resources.

[4] References that include a section twist (§) are found in the Internet References Cited section.

2001, proven reserves at Questa were 16.3 Mt of ore grading 0.343% MoS_2 at a cutoff grade of 0.25% MoS_2; probable reserves were 47.2 Mt of ore grading 0.315% MoS_2; and possible reserves were 3.22 Mt of ore grading 0.369% MoS_2. When proven and probable reserves are considered, the mine life is 25 to 35 years, and when resources are included, the mine life is 50 to 80 years.

Molycorp also continued with a reclamation and revegetation program to cover overburden dumps at the inactive open pit site. In 2000, Molycorp posted a $129 million cleanup bond in response to concerns expressed by the New Mexico Environment Department about reclamation of the mine site (Paydirt, 2000). In May 2000, the U.S. Environmental Protection Agency proposed the Questa Mine for the National Priorities List; as a result, the USGS and the State of New Mexico were conducting additional hydrologic studies.

The Carlsbad potash district is the largest potash-producing area in the United States. Mississippi Potash, Inc. (a subsidiary of Mississippi Chemical Corp.) and IMC Kalium Potash Mines (a subsidiary of IMC Global Inc.) operate mines in the district. Total production for IMC Kalium in 2001 was almost 2 Mt of finished product (IMC Global Inc., 2002§, p. 6). IMC Kalium's reserves were estimated to be 169 Mt of potash ore that are estimated to yield 11.3 Mt of concentrate from sylvinite with an average grade of 60% potassium oxide (K_2O) and 31.3 Mt of langbeinite concentrate with an average grade of 22% K_2O.

Mississippi Potash production capacity was estimated to be 1.1 million metric tons per year from its two facilities at Carlsbad. In 2001, the company sold 928,000 t (Mississippi Chemical Corp., 2002§, p. 8-10). In 2001, total reserves were estimated to be 576 Mt with an average grade of 15.2% K_2O; recoverable reserves were estimated to be 510 Mt at a grade of 14.7% K_2O.

St. Cloud Mining Co. (a subsidiary of The Goldfield Corp.) operates the largest zeolite mine in the United States at the Stone House Mine in Sierra County. The mining property consists of approximately 607 ha and contains 18.3 Mt of reserves. Clinoptilolite was mined, crushed, dried, and sized without beneficiation and was shipped packaged to meet customers' specifications. In 2001, St. Cloud produced 16,000 t of natural zeolite. The company has made several modifications to its zeolite operation, including the addition of cation exchange capacity for added value products and additional classification capabilities to expand markets for their products. The updated facility has crushing and sizing capacity of 500 metric tons per day.

Pumice is found in the Jemez Mountains and the Mogollon-Datil volcanic field. Six operations were active in New Mexico in 2001. The expansion of the El Cajete pumice mine in the Jemez Mountains in Copar Pumice County was delayed until an Environmental Impact Statement could be completed.

Only one mine, the U.S. Hill Mine (owned by Oglebay Norton Co.) in Taos County, produces mica in New Mexico. Oglebay had acquired the mine in December 1999 from Franklin Industries; in 2001, the company was the largest producer of muscovite mica in the United States. The mine was the fourth largest scrap-mica mine in the United States and covered approximately 6 ha in 2001. The planned expansion would increase the size to 36 ha within 20 years. The nearby Picuris Pueblo (native Americans) opposed any expansion of the mine.

Two types of clay were mined in New Mexico—common and fire clay. New Mexico ranked sixth in production of fire clay in 1999; production, which comes from Luna and Grant Counties, amounted to 1,000 t.

Gemstones and semiprecious stones produced in New Mexico include agate, azurite, geodes, fluorite, moonstone, onyx, peridot, smithsonite, and turquoise. Production statistics for 1998 to 2001 are withheld. Depletion of known deposits and difficulty in and expense of adhering to Federal, State, and local environmental regulations have closed most of the commercial mines. Although garnet has not been produced in New Mexico from 1998 to 2001, at least one company was examining areas in the State having a potential to contain these resources that could be produced for use as an abrasive. Garnet typically is found in skarn deposits in southern and central New Mexico, and in some areas, it is a major constituent of waste rock piles remaining after recovery of metals (Lueth, 1996).

Other minerals produced in New Mexico in smaller amounts are helium, perlite, silica, and sulfuric acid. Helium is produced from the Shiprock and the Ute Dome fields in the San Juan Basin. Perlite is produced from three mines in New Mexico. Iron ore consisting primarily of magnetite was shipped from the magnetite tailings at Phelps Dodge's Cobre Mine in Grant County. Silica flux was mined from two quarries near the copper smelter at Hurley. Sulfuric acid was produced as a byproduct of copper smelters in Grant County.

Only one company, Quivira Mining Co. (owned by Bulletin BHP), produced uranium from 1998 to 2001 in New Mexico from waters recovered from inactive underground operations at Ambrosia Lake. Homestake Mining Co. completed reclamation drilling in January 2002 and planned to complete reclamation of the Homestake mill at Milan in 2004.

References Cited

Lueth, V.W., 1996, Garnet resource potential in southern New Mexico, *in* Austin, G.S., Barker, J.M., Hoffman, G., Gilson, N., and Zidec, J., eds., Proceedings of the 31st Forum on the Geology of Industrial Minerals—Borderland Forum: New Mexico Bureau of Mines and Mineral Resources Bulletin 154, p. 137-146.

Paydirt, 2000, EPA says it's still considering superfund status for Questa: Paydirt, no. 737, p. 34.

Internet References Cited

IMC Global, Inc., 2002, Form 10K, accessed April 18, 2002, at URL http://www.IMCGlobal.com/investor/10k-10Q/10k/2001/Imc10k2001.pdf.

Mississippi Chemical Corp., 2002, Form 10K, accessed April 18, 2002, at URL http://www.misschem.com/scrReports/10K_2001.pdf.

Phelps Dodge Corp., 2002, Form 10K, accessed April 24, 2002, at URL http://www.sec.gov/Archives/edgar/data/78066/000095015302000502/p66069e10-k405.htm.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN NEW MEXICO 1/ 2/

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral	1999		2000		2001 p/	
	Quantity	Value	Quantity	Value	Quantity	Value
Clays:						
Common	W	W	34	256	34	256
Fire	1	W	--	--	--	--
Copper 3/	197	330,000	195	380,000 r/	140	235,000
Gemstones	NA	13	NA	27	NA	33
Sand and gravel, construction	10,600	53,000	13,400	66,800	12,000	60,600
Stone:						
Crushed	3,710 r/	22,200	3,690	22,400	3,700	23,100
Dimension metric tons	17,900	2,320	W	W	W	W
Zeolites do.	(4/)	NA	(4/)	NA	(4/)	NA
Combined values of cement, gold, gypsum (crude), iron ore (usable), lime (2000-01), mica (crude), molybdenum concentrates, perlite (crude), potash, pumice and pumicite, salt, sand and gravel (industrial), silver, and values indicated by symbol W	XX	311,000 r/	XX	317,000 r/	XX	295,000
Total	XX	719,000 r/	XX	786,000 r/	XX	295,000

p/Preliminary. r/Revised. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined values" data. XX Not applicable. -- Zero.

1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/ Data are rounded to no more than three significant digits; may not add to totals shown.

3/ Recoverable content of ores, etc.

4/ Withheld to avoid disclosing company proprietary data.

TABLE 2
NEW MEXICO: CRUSHED STONE SOLD OR USED, BY KIND 1/

Kind	1999				2000			
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone	17 r/	2,000	$7,750	$3.87	17	2,200	$9,320	$4.25
Granite	2	W	W	8.64	2	W	W	10.08
Sandstone	--	--	--	--	1	W	W	9.72
Volcanic cinder and scoria	7 r/	W	W	11.80 r/	7	W	W	12.12
Miscellaneous stone	15	364	2,060	5.66	15	637	3,830	6.01
Total or average	XX	3,710 r/	22,200	5.98	XX	3,690	22,400	6.07

r/ Revised. W Withheld to avoid disclosing proprietary data; included in "Total." XX Not applicable. -- Zero.

TABLE 3
NEW MEXICO: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+1 1/2 inch):			
Riprap and jetty stone	93	$658	$7.08
Filter stone	1	5	5.00
Other coarse aggregate	1	5	5.00
Total or average	95	668	7.03
Coarse aggregate, graded:			
Concrete aggregate, coarse	237	1,560	6.58
Bituminous aggregate, coarse	W	W	10.40
Bituminous surface-treatment aggregate	114	1,230	10.80
Railroad ballast	W	W	10.50
Other graded coarse aggregate	696	4,600	6.60
Total or average	1,050	7,390	7.06
Fine aggregate (-3/8 inch):			
Stone sand, concrete	110	577	5.25
Screening, undesignated	W	W	7.73
Other fine aggregate	42	288	6.86
Total or average	152	865	5.69
Coarse and fine aggregates:			
Graded road base or subbase	160	789	4.93
Terrazzo and exposed aggregate	W	W	27.81
Crusher run or fill or waste	89	348	3.91
Roofing granules	W	W	15.50
Other coarse and fine aggregates	104	2,700	25.91
Total or average	353	3,830	10.86
Other construction materials	151	932	6.17
Agricultural, poultry grit and mineral food	(3/)	(3/)	(3/)
Unspecified: 4/			
Reported	877	4,430	5.05
Estimated	1,000	4,300	4.23
Total or average	1,890	8,710	4.61
Grand total or average	3,690	22,400	6.07

W Withheld to avoid disclosing company proprietary data; included with "Other."

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Includes granite, limestone, miscellaneous stone, sandstone, and volcanic cinder and scoria.

3/ Less than ½ unit.

4/ Reported and estimated production without a breakdown by end use.

TABLE 4
NEW MEXICO: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE AND DISTRICT 1/ 2/

(Thousand metric tons and thousand dollars)

	District 1		District 2		Unspecified districts	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1 1/2 inch) 3/	W	W	W	W	--	--
Coarse aggregate, graded 4/	W	W	W	W	--	--
Fine aggregate (-3/8 inch) 5/	W	W	W	W	--	--
Coarse and fine aggregate 6/	213	3,210	140	621	--	--
Other construction materials	17	106	134	826	--	--
Agricultural 7/	(8/)	(8/)	--	--	--	--
Unspecified: 9/						
Reported	84	489	422	1,770	371	2,170
Estimated	780	3,330	230	1,000	--	--
Total	2,060	14,000	1,260	6,230	371	2,170

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes granite, limestone, miscellaneous stone, sandstone, and volcanic cinder and scoria.

3/ Includes filter stone, riprap and jetty stone, and other coarse aggregate.

4/ Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), railroad ballast, and other graded coarse aggregate.

5/ Includes screening (undesignated), stone sand (concrete), and other fine aggregate.

6/ Includes crusher run (select material or fill), graded road base or subbase, roofing granules, terrazzo and exposed aggregate, and other coarse and fine aggregates.

7/ Includes poultry grit and mineral food.

8/ Less than ½ unit.

9/ Reported and estimated production without a breakdown by end use.

TABLE 5
NEW MEXICO: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	2,310	$16,800	$7.28
Plaster and gunite sands	202	1,110	5.49
Concrete products (blocks, bricks, pipe, decorative, etc.)	26	400	15.38
Asphaltic concrete aggregates and other bituminous mixtures	1,150	6,990	6.07
Road base and coverings	1,670	7,930	4.74
Fill	301	926	3.08
Snow and ice control	18	98	5.44
Other miscellaneous uses 2/	41	285	6.95
Unspecified: 3/			
Reported	5,270	18,800	3.56
Estimated	2,400	14,000	5.55
Total or average	13,400	66,800	4.97

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Includes railroad ballast, and snow and ice control.

3/ Reported and estimated production without a breakdown by end use.

TABLE 6
NEW MEXICO: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		Unspecified districts	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate (including concrete sand)	1,700	13,500	609	3,270	--	--
Concrete products (blocks, bricks, pipe, decorative, etc.) 2/	126	1,030	103	481	--	--
Asphaltic concrete aggregates and road base materials	2,190	12,000	638	2,940	--	--
Other miscellaneous uses 3/	159	591	202	718	--	--
Unspecified: 4/						
Reported	2,590	11,700	828	3,990	1,860	3,080
Estimated	1,200	7,500	1,200	6,000	--	--
Total	7,940	46,300	3,620	17,400	1,860	3,080

-- Zero.

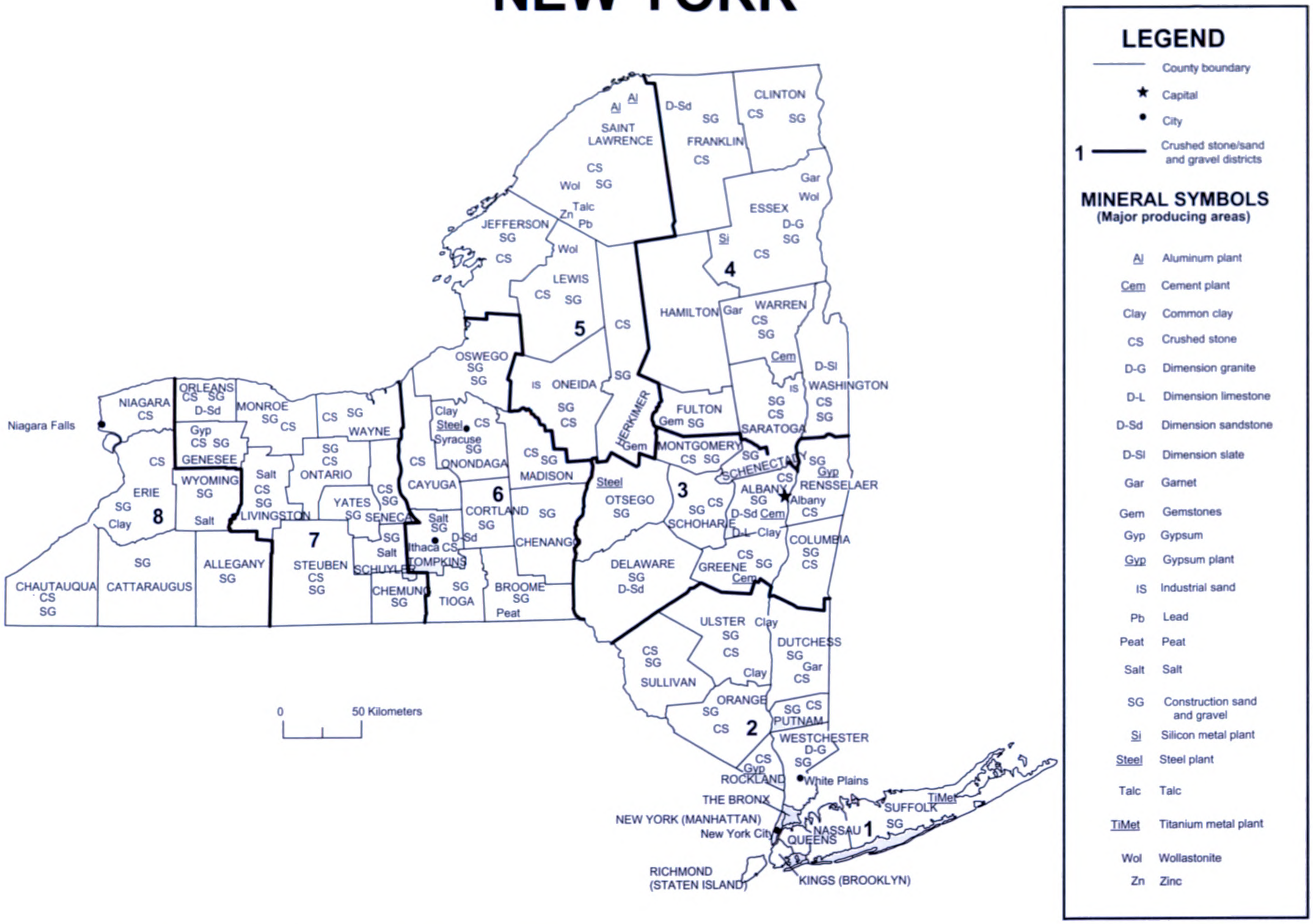
1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes plaster and gunite sands.

3/ Includes fill, railroad ballast, and snow and ice control.

4/ Reported and estimated production without a breakdown by end use.

NEW YORK



Source: New York State Geological Survey/U.S. Geological Survey (2001)

THE MINERAL INDUSTRY OF NEW YORK

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the New York State Geological Survey for collecting information on all nonfuel minerals.

In 2001, the estimated value[1] of nonfuel raw mineral production for New York was $1.05 billion, based upon preliminary U.S. Geological Survey (USGS) data. This was about a 4% increase from that of 2000[2] and followed a 1.6% increase from 1999 to 2000. New York was 14th in rank (13th in 2000) among the 50 States in total nonfuel mineral production value, of which the State accounted for more than 2.5% of the U.S. total.

In 2001, crushed stone, by value, remained New York's leading nonfuel mineral, followed by cement (portland and masonry), salt, construction sand and gravel, and wollastonite. Increases in the values of all five commodities, which accounted for more than 93% of the State's total nonfuel mineral production value, led to the State's overall rise in value. The State's major construction material commodities—crushed stone, cement, construction sand and gravel, and gypsum—accounted for more than 70% of the State's nonfuel mineral value. Zinc represented the large majority of New York's metal production and value.

In 2000, New York's increase in value resulted mostly from increases in crushed stone, salt, cement, and construction sand and gravel, moderated somewhat by decreases in the values of wollastonite, common clays, zinc, dimension stone, and industrial sand and gravel (descending order of change in value) (table 1). All other changes had minimal effect on the overall net result.

Based on USGS estimates of the quantities produced in the 50 States in 2001, New York remained the only State to produce wollastonite and continued to be second of 3 industrial-garnet-producing States, third in salt, and fourth in zinc and talc. The State remained 10th in rank in masonry cement and increased to 9th from 10th in the production of portland cement. Additionally, New York mining and mineral processing operations produced significant quantities of crushed stone, construction sand and gravel, dimension stone, and common clays (descending order of value).

The following narrative information was provided by the New York State Geological Survey (NYSGS) and the Division of Mineral Resources[3] (DMR) of the New York State Department of Environmental Conservation. According to the DMR, 378 mined land reclamation permits were issued statewide during 2001, of which 71 were for new mines. Mined Land staff approved final reclamation of 298 hectares (ha) at 92 mines and approved concurrent reclamation of an additional 46 ha at operating mines. The difficulty of obtaining permits for new mines has led to a decrease in the number of applications for new permits and an increase in the average size of existing mines. Permit renewals and modifications are expected to increase to approximately 450 in 2002 and more than 500 in 2003. A total of 18,861 ha is currently affected by mining, an increase of 970 ha from the previous year.

The DMR reported that lake mining for sand and gravel began on Long Island. The first freshwater dredge was up and running in Suffolk County. A mining company in the Town of Manorville purchased and installed a dredge that will pump about 380 to more than 570 cubic meters of material an hour. After the material is pumped out of the lake, the material is allowed to drain before it is processed through a screening plant. Mining plans call for the creation of a 16-ha lake with a total life of mine to include the mining of about 36 ha. Several other mining projects in Long Island will also result in the creation of large lakes. A permit was issued to a mining company in the Town of Brookhaven, Suffolk County, for a project that entails mining into the water table to create a 61-ha freshwater lake.

In November 2000, in time for the 2000-01 winter season in the northeastern United States, the new American Rock Salt Co. Inc. salt mine, the Hampton Corners Mine, went into production. The mine is located in Hampton Corners, Livingston County, and is (figuratively) the successor to Azko Nobel's Retsof Mine (rock salt), which was lost because of roof failure and flooding in 1996. The mine produced rock salt used mainly for ice and snow mitigation and is a major supplier to customers in the northeast. This mine is a few miles southeast of the southern margin of the Akzo Mine and is in the Vernon Formation "B" bed of salt, the same location that had been mined previously.

The DMR reported that there was a major washout at a sand and gravel mine in the Town of Russia, Herkimer County. The mine suffered a major washout of its haul road that resulted in 5,350 cubic meters of sand flowing over a distance of 1.3 kilometers. The water deposited material about one-half a meter deep on a country road, and some of this material eventually entered Mill Creek, a trout stream. The cause of the flood was inadequate stormwater management that resulted in water being impounded behind a portion of the haul road, which then gave way. An enforcement case has been prepared.

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[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2001 USGS mineral production data published in this chapter are preliminary estimates as of August 2002 and are expected to change. For some mineral commodities, such as construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Specialist contact information may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals/contacts/comdir.html; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2] Values, percentage calculations, and rankings for 2000 may differ from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also change.

[3] William Kelly, Associate Scientist with the NYSGS (a bureau of the New York State Museum in the State Education Department), Division of Research and Collections, and Steven Potter, Mined Land Reclamation Specialist II with the New York State Department of Environmental Conservation, Division of Mineral Resources, coauthored the text of the State mineral industry information provided by those agencies.

Buffalo Crushed Stone, Inc. (BCS) received the 2001 Mined Land Reclamation Award at the New York State Fair for its efforts to voluntarily reclaim a 74-ha lake complex that had been old gravel pits in the Town of Machias, Cattaraugus County. These old mines had been exempt from New York's Mined Land Reclamation Law. BCS acquired the property in 1982 as part of a larger purchase. During the next two decades, BCS cleaned up the garbage-strewn area and developed a recreational complex for its employees, including a beach, tennis court, lodge, hiking trails, and fishing opportunities on three separate deep lakes. Additional wetlands were constructed during reprocessing of previously mined material.

The NYSGS continued bedrock and surficial geologic mapping projects in several regions of the State. Mapping priority is being given to areas where the expansion of resource development might be in proximity to urban areas or along transportation corridors, thereby motivating a need for and understanding of those mineral resources, among other topics. Maps are being produced at a scale of 1:24,000. In 2001, digital maps were produced in seven quadrangles in the central portion of New York. NYSGS staff completed thematic mapping of bentonite beds throughout the Appalachian Basin from New York to Virginia to Ohio. This mapping project included the correlation of ashfalls in the Lower and Middle Devonian.

In 2001, the NYSGS began work on a project of identifying rock formations for potential brine disposal in the northern Appalachian Basin. Brine disposal is the last barrier to gas storage development in artificial caverns in evaporite deposits underlying New York. Cavern storage has been found to be a very efficient means of conveniently providing supplies of natural gas, especially for demand peaks that happen on a daily basis. Further, cavern storage offers economic incentives for electrical generating companies and natural gas suppliers to purchase large quantities of gas during periods of low demand for use during the winter months. The project will examine options available to the fuels industry for disposal of brine generated during development of caverns for gas storage.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN NEW YORK 1/ 2/

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral	1999		2000		2001 p/	
	Quantity	Value	Quantity	Value	Quantity	Value
Cement, portland	W	W	2,700	211,000 e/	2,940 e/	230,000 e/
Clays, common	W	W	630	7,820	630	7,820
Gemstones	NA	68	NA	64	NA	64
Salt	4,220	209,000	5,440	218,000	5,510	224,000
Sand and gravel, construction	29,900	152,000	29,700	154,000	30,800	162,000
Stone:						
Crushed	46,200 r/	266,000 r/	48,800	304,000	50,200	322,000
Dimension metric tons	49,300	8,940	62,200	5,780	91,300	10,000
Combined values of cement (masonry), garnet (industrial), gypsum (crude), lead, peat, sand and gravel (industrial), silver (1999), talc (crude), wollastonite, zinc, and values indicated by symbol W	XX	358,000	XX	114,000 r/	XX	94,300
Total	XX	994,000 r/	XX	1,010,000 r/	XX	1,050,000

e/ Estimated. p/ Preliminary. r/ Revised. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined values" data. XX Not applicable.

1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/ Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 2
NEW YORK: CRUSHED STONE SOLD OR USED, BY KIND 1/

	1999				2000			
Kind	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone	55 r/	23,800 r/	$138,000 r/	$5.58	61	29,500	$165,000	$6.24
Dolomite	11 r/	8,480 r/	50,700 r/	5.98 r/	12	8,380	60,800	7.25
Limestone-dolomite	8 r/	4,420 r/	25,300 r/	5.72 r/	8	4,840	26,500	5.47
Granite	9	2,240 r/	13,500 r/	6.03 r/	8	4,000	20,500	5.12
Marble	1	W	W	5.76	1	W	W	3.52
Sandstone 2/	12	1,830	13,700	7.46	11	1,550	10,700	6.91
Traprock	3	W	W	5.49	3	W	W	9.30
Slate	1	W	W	5.51	1	W	W	5.66
Miscellaneous stone	3 r/	914 r/	5,010 r/	5.48 r/	4	807	4,530	5.61
Total or average	XX	46,200 r/	266,000 r/	5.75	XX	48,800	304,000	6.22

r/ Revised. W Withheld to avoid disclosing company proprietary data; included in "Total." XX Not applicable.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes sandstone-quartz to avoid disclosing company proprietary data.

TABLE 3
NEW YORK: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+1 1/2 inch):			
Macadam	175	$1,690	$9.65
Riprap and jetty stone	326	2,390	7.32
Filter stone	132	575	4.36
Other coarse aggregate	301	2,640	8.77
Total or average	934	7,290	7.81
Coarse aggregate, graded:			
Concrete aggregate, coarse	4,620	37,200	8.04
Bituminous aggregate, coarse	5,620	43,000	7.65
Bituminous surface-treatment aggregate	514	3,930	7.65
Railroad ballast	11	46	4.18
Other graded coarse aggregate	3,070	25,400	8.27
Total or average	13,800	109,000	7.92
Fine aggregate (-3/8 inch):			
Stone sand, concrete	1,100	9,050	8.22
Stone sand, bituminous mix or seal	437	2,650	6.06
Screening, undesignated	208	1,150	5.54
Other fine aggregate	1,290	9,570	7.39
Total or average	3,040	22,400	7.38
Coarse and fine aggregates:			
Graded road base or subbase	4,170	26,500	6.37
Unpaved road surfacing	W	W	5.93
Crusher run or fill or waste	2,820	12,300	4.37
Roofing granules	W	W	5.75
Other coarse and fine aggregates	3,140	17,900	5.71
Total or average	10,100	56,800	5.61
Other construction materials 3/	471	3,230	6.85
Agricultural, agricultural limestone	(4/)	(4/)	9.05
Chemical and metallurgical, cement manufacture	(4/)	(4/)	3.54
Special, asphalt fillers or extenders	(5/)	(5/)	(5/)
Unspecified: 6/			
Reported	8,520	47,100	5.53
Estimated	7,200	40,000	5.53
Total or average	15,800	87,200	5.53
Grand total or average	48,800	304,000	6.22

W Withheld to avoid disclosing company proprietary data; included with "Other."

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes dolomite, granite, limestone, limestone-dolomite, marble, miscellaneous stone, sandstone, sandstone-quartz, slate, and traprock.

3/ Includes drain fields.

4/ Withheld to avoid disclosing company proprietary data; included in "Grand total."

5/ Less than ½ unit.

6/ Reported and estimated production without a breakdown by end use.

TABLE 4
NEW YORK: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE AND DISTRICT 1/ 2/

(Thousand metric tons and thousand dollars)

	District 2		District 3		District 4		District 5	
Use	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Construction:								
Coarse aggregate (+1 1/2 inch) 3/	298	2,680	343	2,680	W	W	W	W
Coarse aggregate, graded 4/	8,130	72,300	1,730	13,600	W	W	W	W
Fine aggregate (-3/8 inch) 5/	1,610	13,300	480	3,410	W	W	W	W
Coarse and fine aggregate 6/	1,900	13,700	W	W	1,270	5,100	1,050	4,100
Other construction materials 7/	--	--	--	--	--	--	(8/)	(8/)
Agricultural 9/	--	--	W	W	W	W	W	W
Chemical and metallurgical 10/	--	--	W	W	W	W	--	--
Special 11/	--	--	--	--	--	--	--	--
Unspecified: 12/								
Reported	--	--	1,030	5,680	--	--	2,170	11,900
Estimated	2,600	14,000	350	2,000	1,100	6,500	600	2,900
Total	14,500	116,000	8,620	46,500	3,650	16,200	4,950	24,900

	District 6		District 7		District 8	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1 1/2 inch) 3/	W	W	W	W	W	W
Coarse aggregate, graded 4/	414	2,240	W	W	W	W
Fine aggregate (-3/8 inch) 5/	114	832	W	W	W	W
Coarse and fine aggregate 6/	W	W	W	W	W	W
Other construction materials 7/	6	25	--	--	465	3,200
Agricultural 9/	W	W	W	W	W	W
Chemical and metallurgical 10/	--	--	--	--	--	--
Special 11/	--	--	(8/)	(8/)	--	--
Unspecified: 12/						
Reported	2,330	12,800	3,000	16,700	(8/)	(8/)
Estimated	1,600	8,700	880	4,900	130	710
Total	4,860	26,600	8,090	46,100	4,100	27,000

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ No production reported in District 1.

3/ Includes filter stone, macadam, riprap and jetty stone, and other coarse aggregate.

4/ Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), railroad ballast, and other graded coarse aggregate.

5/ Includes screening (undesignated), stone sand (bituminous mix or seal), stone sand (concrete), and other fine aggregate.

6/ Includes crusher run (select material or fill), graded road base or subbase, roofing granules, unpaved road surfacing, and other coarse and other fine aggregates.

7/ Includes drain fields.

8/ Less than ½ unit.

9/ Includes agricultural limestone.

10/ Includes cement manufacture.

11/ Includes asphalt fillers or extenders.

12/ Reported and estimated production without a breakdown by end use.

TABLE 5
NEW YORK: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	6,670	$41,300	$6.19
Plaster and gunite sands	257	1,450	5.63
Concrete products (blocks, bricks, pipe, decorative, etc.)	299	2,310	7.74
Asphaltic concrete aggregates and other bituminous mixtures	2,370	12,800	5.39
Road base and coverings 2/	4,180	18,400	4.39
Road stabilization (lime)	5	14	2.80
Fill	2,740	9,110	3.32
Snow and ice control	895	3,240	3.62
Other miscellaneous uses 3/	523	3,310	6.32
Unspecified: 4/			
Reported	4,330	25,000	5.76
Estimated	7,500	37,000	4.97
Total or average	29,700	154,000	5.18

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes road and other stabilization (cement).

3/ Includes railroad ballast and roofing granules.

4/ Reported and estimated production without a breakdown by end use.

TABLE 6
NEW YORK: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3		District 4	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products 2/	2,440	15,700	661	5,050	822	4,170	258	1,200
Asphaltic concrete aggregates and other bituminous mixtures	W	W	179	1,190	364	1,810	W	W
Roadbase and coverings 3/	63	481	239	1,630	948	4,200	542	1,800
Fill	215	696	65	281	751	2,580	391	953
Snow and ice control	W	W	24	172	248	956	121	454
Other miscellaneous uses 4/	162	1,590	42	120	113	591	173	593
Unspecified: 5/								
Reported	208	2,730	395	3,710	66	353	32	369
Estimated	340	1,800	1,100	6,200	1,100	5,300	1,400	6,600
Total	3,420	23,000	2,690	18,300	4,440	20,000	2,870	11,900

Use	District 5		District 6		District 7		District 8	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products 2/	191	895	1,240	7,860	518	2,830	1,110	7,370
Asphaltic concrete aggregates and other bituminous mixtures	W	W	839	5,230	291	1,710	W	W
Roadbase and coverings 3/	234	916	694	3,010	930	3,590	538	2,760
Fill	189	870	490	1,890	401	1,170	240	666
Snow and ice control	70	201	248	843	113	419	W	W
Other miscellaneous uses 4/	109	535	168	834	48	281	479	1,830
Unspecified: 5/								
Reported	632	3,400	273	1,100	409	2,680	2,320	10,600
Estimated	640	3,100	990	4,700	1,300	6,300	630	3,200
Total	2,070	9,870	4,940	25,400	4,000	18,900	5,310	26,400

W Withheld to avoid disclosing company proprietary data; included with "Other miscellaneous uses."

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

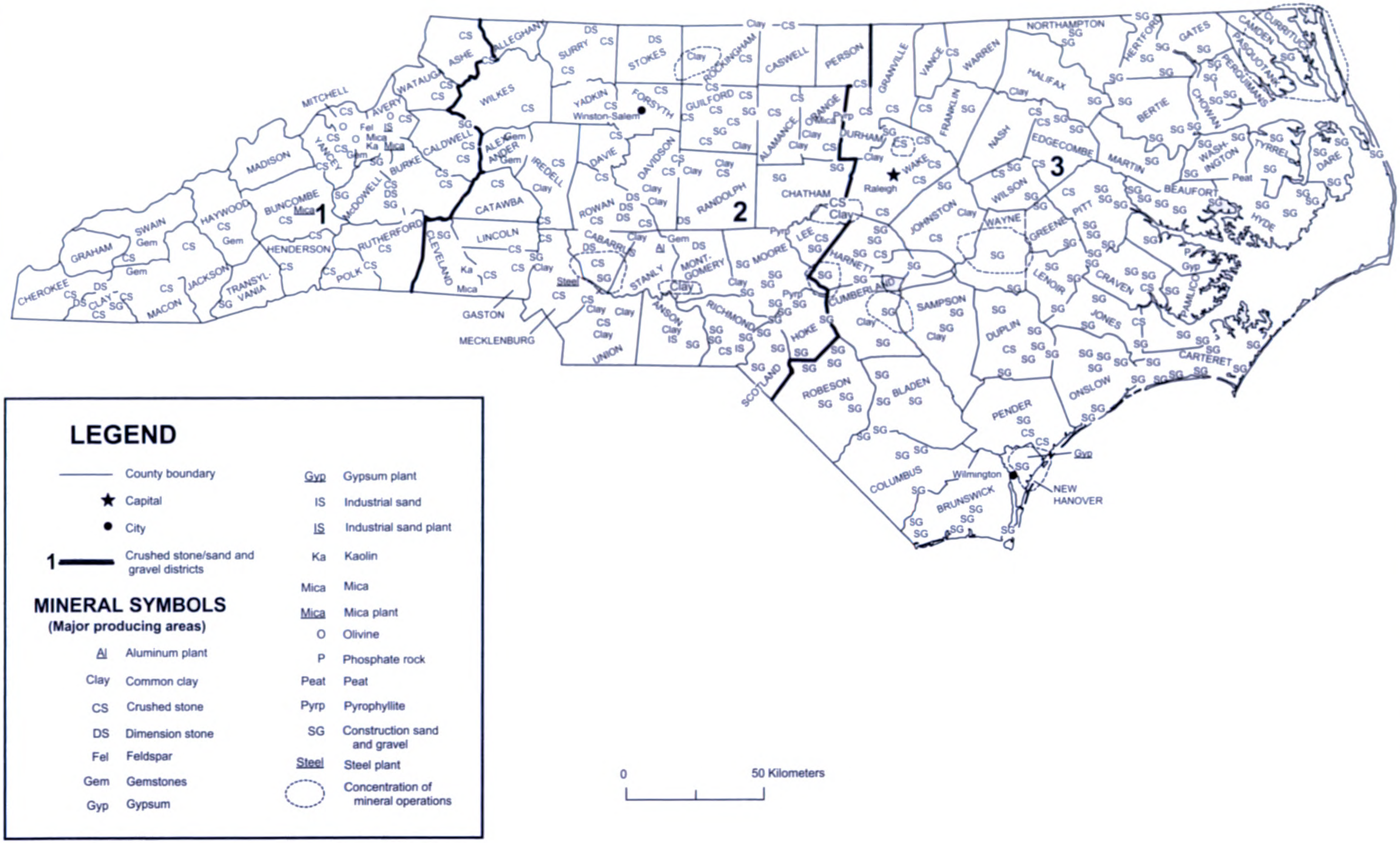
2/ Includes plaster and gunite sands.

3/ Includes road and other stabilization (cement and lime).

4/ Includes railroad ballast and roofing granules.

5/ Reported and estimated production without a breakdown by end use.

NORTH CAROLINA



Source: North Carolina Geological Survey/U.S. Geological Survey (2001)

THE MINERAL INDUSTRY OF NORTH CAROLINA

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the North Carolina Geological Survey for collecting information on all nonfuel minerals.

In 2001, the estimated value[1] of nonfuel mineral production for North Carolina was $744 million, based upon preliminary U.S. Geological Survey (USGS) data. This was unchanged from that of 2000[2] and followed a marginal increase from 1999 to 2000. For the fourth consecutive year, the State was 19th in rank among the 50 States in total nonfuel mineral production value, of which North Carolina accounted for about 2% of the U.S. total.

In 2001, the largest increase in value was that of crushed stone, up about $7 million. But this and other smaller increases were balanced out by a larger decrease in phosphate rock, a $4 million drop in the value of construction sand and gravel, and several smaller decreases in other mineral commodities. In 2000, increases in the values of crushed stone (up $19 million), along with smaller increases in feldspar, industrial sand and gravel, and pyrophyllite, more than offset decreases that occurred in phosphate rock (down $15 million), construction sand and gravel (down $4 million), gemstones (down $2.5 million), plus several smaller decreases, resulting in the year's net increase.

Based upon 2001 USGS estimates of the quantities of minerals produced in the 50 States, North Carolina was the only pyrophyllite-producing State, and it continued as the leading State in common clay, feldspar, and mica; second of 2 States that produced olivine; and eighth in crushed stone. While the State increased to 5th from 6th in kaolin and to 10th from 11th in dimension stone, it decreased to 3d from 2d in phosphate rock and to 8th from 7th in industrial sand and gravel. Additionally, the State was a significant producer of construction sand and gravel and gemstones. Metal production in the State, especially that of primary aluminum and raw steel, resulted from the processing of recycled materials or raw materials received from other domestic and foreign sources.

The following narrative information was provided by the North Carolina Geological Survey[3] (NCGS). PCS Phosphate Co., Inc. (PotashCorp.) set production records. Purified acid production was 169,000 metric tons (t), which was 20% greater than the previous record; hydroflurosilic acid (HFSA) production was 7,479 t (100% strength), which was 16% greater than the previous record. A purified acid plant project began in March 2002; a facility in Charleston, SC, was scheduled to receive an acid shipment in July 2002. Full production startup is scheduled for March 2003. Additional facility engineering and equipment updating is in progress.

According to PCS' annual report, diammonium phosphate (DAP) production was cut back at the Aurora, NC, plant along with that of other producers. The company's purified acid plant production was consolidated at Aurora in January 2002. Aurora now produces the acid for both the company's Aurora and Cincinnati, OH, plants. Because of Aurora's vertical integration, which offers cost savings, PCS has invested $80 million to expand by 50% capacity at the Aurora purified phosphate plant. Much of the output is sold under contract for industrial and food-grade products. Also PCS is building a $51 million plant to produce 144,000 metric tons per year of the poultry feed ingredient defluorinated phosphate (DFP). This plant will make the lowest cost DFP in the world; much of the production will go to offshore markets (PotashCorp, 2002§[4]). The plant is slated for startup in mid-2002.

PCS achieved 1 million hours worked without a lost time injury. Prior to that, it had achieved 9.9 million hours until it had one lost time accident.

The Wildlife Habitat Council certified Unimin Corp.'s Green Mountain olivine production facility near Burnsville, NC, in 2001. The Council is an international nonprofit organization working to improve wildlife habitat on company lands through cooperation between companies, the local communities, and environmental groups. The Green Mountain operation joins three other Unimin, NC, operations (Marston, Red Hill, and Schoolhouse Plants) that received certification in 1999. In total, Unimin has 27 facilities in the United States and Canada certified by the Wildlife Habitat Council.

Suzorite Mineral Products Inc. (part of Zemex Corp.), Murphy, NC, continued grinding of small quantities of barite imported from a Tennessee mine.

Vulcan Materials Co. was ranked among the top 10 companies in the United States for social responsibility in Fortune Magazine's "America's Most Admired Companies" list.

In March 2002, 3M's roofing granule production plant started, and full production is anticipated by mid-2002. Raw materials were being mined by the Luck Stone Co. The operation is located south of Pittsboro, NC.

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[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2001 USGS mineral production data published in this chapter are preliminary estimates as of August 2002 and are expected to change. For some mineral commodities, such as construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Specialist contact information may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals/contacts/comdir.html; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2] Values, percentage calculations, and rankings for 2000 may differ from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also change.

[3] Jeffrey Reid, Senior Geologist for Minerals and Geographic Information Systems, authored the text of the State mineral industry information provided by the North Carolina Geological Survey.

[4] A reference that includes a section twist (§) is found in the Internet Reference Cited section.

North Carolina brick manufacturers supply approximately 15% of the Nation's brick supply. Eleven companies produced more than 1.2 billion units in 2001. With a national output of nearly 8 billion units for all manufacturers, North Carolina ranks first among the single State producers. Other major brick producers include the States of Georgia, Ohio, and Texas.

Hendrick Industries won top honors in two National Awards Programs (Interstate Mining Compact Commission and National Association of State Land Reclamationists) that recognized public outreach in education efforts in 2001. The North Carolina Mining Commission's Award Selection Committee selected Hendrick Industries as the 2002 Mining Stewardship Award winner for its public outreach efforts in western North Carolina. Hendrick did an extensive exhibit at the Colburn Minerals Museum in Asheville, NC. It also has a community advisory council that conducts open houses at its quarry operations in the western part of the State.

Zemex Mica Corp., located in Yancey Co., NC, won three reclamation awards in 2001. These included the Department of Environment and Natural Resources' Land Quality Section Outstanding Mine Reclamation Award, the Interstate Mining Compact Commission's Honorable Mention Award, and first place from National Association of State Land Reclamationists.

Government Programs

Two new segments, "Crushed stone (aggregate) resources of North Carolina," and "Building stone (dimension stone) of North Carolina," were added to NCGS's Internet site. These will be of interest to academia, industry, and government and are available on the Internet at URL http://www. geology.enr.state.nc.us under "What's New." Both segments provide virtual quarry tours, product information, location of operators, and contact information. The Crushed Stone Resources segment provides a summary of 30 years of production and value for crushed stone, construction sand and gravel, and industrial sand and clay.

NCGS staff continued to assist Land Quality Section staff with mine permit review (new and renewals). Mine permit applications, other forms, and contact information are at the Land Quality Section's Internet site at URL http://dlr.enr.state.nc.us/mining.html. Links to a list of permitted active and inactive mines in North Carolina as of May 8, 2002, are on the NCGS' "What's New" page (follow link from the NCGS home page at URL http://www.geology.enr.state.nc.us). Updates to the permitted mine list are posted periodically throughout the year; alternatively, clients may contact the Land Quality Section for updates.

Mining permits are a good gauge of minerals activity in North Carolina. A synopsis consisting of Internet-based tables and a Microsoft PowerPoint overview is available at the NCGS' home page via the "Minerals Information" and "Permitted Active and Inactive mines, updated May 8, 2002" links.

NCGS released a CD-ROM publication entitled "Mines and Prospects of Cabarrus, Gaston, Lincoln, Mecklenburg, Stanly, and Union Counties, North Carolina," Open-file reports 2002-2007. These reports contained maps of known mine locations in the six North Carolina counties and were prepared as planning aids for local governments and private citizens. Publication of the maps and data was prompted by subsidence over abandoned underground workings at the Phoenix Gold Mine, Cabarrus County, NC, during February 2000.

Mining for gold and other precious metals occurred in the 18th and 19th centuries at hundreds of locations in North Carolina and into the early 20th century at some localities. Although relatively rare, the potential for damaging subsidence will increase as urban growth spreads into once sparsely populated areas where underground mining occurred. Public awareness, zoning, and building permit requirements can help reduce the risk of damaging subsidence or injury. A report of investigation is in progress about residential development over the abandoned North State gold mine workings, located near High Point, NC.

Recognizing the need for planning of available aggregate resources for the future has prompted industry, the State government, and university agencies to partner with the National Academies of Engineering and Science to develop collaborative research programs. The initial studies, which will take about 1 year, are expected to move toward a better understanding of the need to plan for adequate future aggregate supplies.

K-T Feldspar Corp., owned by Imerys USA, Inc., signed an agreement with the Blue Ridge Parkway Foundation to support its educational activities and to sponsor the Museum of North Carolina Minerals. The Blue Ridge Parkway is the most visited site in the U.S. National Park Service system with more than 20 million visitors per year. The museum's objective is to educate children, residents of the community, and the visiting public of mining's contribution to society and the modern quality of life. This is an excellent opportunity for K-T Feldspar, a mica and feldspar producer, to participate in educational activities related to earth sciences and to further display its commitment to the development of its employees' local communities.

The Museum of North Carolina Minerals building renovation was scheduled to be completed by July 2002, and exhibits were undergoing development and should be installed by the 2003 visitors' season that traditionally starts in April or May.

The North Carolina Geological Survey, in cooperation with North Carolina State University, University of North Carolina-Wilmington, University of North Carolina-Asheville, and Western Carolina University, continued detailed geologic mapping funded in part by Public Law 102-285 (National Geologic Mapping Act) in the Raleigh, Asheville, and Henderson, NC, areas. Rapid growth in these regions has accentuated many geologic-related problems, including land-use and infrastructure planning, mineral resource identification—particularly construction aggregates, and environmental assessment and planning related to highway construction, waste disposal siting, and ground water conservation and development. Further information about the geologic mapping in North Carolina and elsewhere in the United States is at URL http://ngmdb.usgs.gov/.

By action of the North Carolina General Assembly, the topographic mapping program was restored to the NCGS in late 2001. A comprehensive photoinspection program was initiated on all 7.5-minute quadrangles east of 80° W. longitude to the Atlantic Ocean using National Technical Means imagery. Expected deliverables are the minor revisions of 100 of the State's 953 quadrangles. Products will consist of paper maps and digital raster graphics. Each State dollar is matched by a Federal dollar in a cooperative program with the USGS.

The North Carolina Minerals Research Laboratory (MRL), in Asheville, a unit of the North Carolina State University's College of Engineering, conducts minerals process research in industrial and metallic minerals for clients worldwide and also conducts State-sponsored mineral process investigations. The MRL conducts extensive mineral science outreach programs, including rock kit distribution in western North Carolina. In 2000-01, mica and quartz continued to be major minerals of industry interest. The MRL conducted studies on the following commodities: boiler ash, clay, feldspar, fly ash, kaolin, iron oxide, mica, phosphate, pyrophyllite, quartz, sand and gravel, smectite, and tantalite.

The MRL initiated a cooperative industry, academic, and State agency project to evaluate the production of lightweight aggregate from high-volume solid waste in western North Carolina. The objective is to use high-volume solid waste generated by local industry to produce a value-added and environmentally benign product that will assist the State's goal of solid waste reduction. The goal is to construct a commercial lightweight aggregate plant located in western North Carolina. Further information about MRL, staff expertise, and laboratory equipment is available at URL http://www.engr.ncsu.edu/mrl/.

Internet Reference Cited

PotashCorp, 2002, PotashCorp is the lowest-cost producer, An Overview of PotashCorp and Its Industry 2002, accessed November 20, 2002, at URL http://www.potashcorp.com/media/pdf/npk_markets/ industry_overview/ 2002_overview.pdf.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN NORTH CAROLINA 1/ 2/

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral	1999		2000		2001 p/	
	Quantity	Value	Quantity	Value	Quantity	Value
Clays, common	2,430	18,700	2,430	18,600	2,430	18,600
Feldspar metric tons	381,000	16,100	W	W	W	W
Gemstones	NA	2,860	NA	372	NA	203
Mica, crude	W	W	W	W	45	4,380
Sand and gravel:						
Construction	11,600	62,900	12,000	59,100	10,800	54,000
Industrial	1,470	27,300	1,480	28,300	1,620	29,900
Stone:						
Crushed	67,000	459,000	69,500	478,000	68,400	485,000
Dimension metric tons	54,700	17,700	40,500	16,800	40,000	16,000
Combined values of clays (kaolin), olivine, peat, phosphate rock, pyrophyllite (crude), and values indicated by symbol W	XX	138,000	XX	143,000	XX	136,000
Total	XX	742,000	XX	744,000	XX	744,000

p/ Preliminary. NA Not available. W Withheld to avoid disclosing company proprietary data; values included with "Combined values" data. XX Not applicable.

1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/ Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 2
NORTH CAROLINA: CRUSHED STONE SOLD OR USED, BY KIND 1/

Kind	1999				2000			
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone	10	6,070	$40,700	$6.70	11	5,710	$38,400	$6.73
Dolomite	1	354	2,360	6.65	1	325	2,170	6.66
Granite	76 r/	50,000	343,000	6.86	75	53,200	365,000	6.87
Calcareous marl	1	W	W	6.00 r/	--	--	--	--
Quartzite	2	W	W	8.05	2	W	W	8.19
Traprock	7 r/	5,130 r/	37,100 r/	7.24 r/	6	5,330	39,600	7.43
Slate	2 r/	W	W	6.61 r/	2	W	W	6.61
Volcanic cinder and scoria	1	W	W	6.61	1	W	W	6.61
Miscellaneous stone	5 r/	2,370 r/	14,800 r/	6.62 r/	5	2,180	13,100	6.02
Total or average	XX	67,000	459,000	6.85	XX	69,500	478,000	6.88

r/ Revised. W Withheld to avoid disclosing company proprietary data, included in "Total." XX Not applicable. -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 3
NORTH CAROLINA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+1 1/2 inch):			
Macadam	264	$1,520	$5.77
Riprap and jetty stone	687	6,980	10.16
Filter stone	234	2,030	8.68
Other coarse aggregate	476	3,030	6.37
Total or average	1,660	13,600	8.17
Coarse aggregate, graded:			
Concrete aggregate, coarse	3,040	22,400	7.35
Bituminous aggregate, coarse	1,950	18,700	9.59
Bituminous surface-treatment aggregate	W	W	8.59
Railroad ballast	1,270	6,920	5.43
Other graded coarse aggregate	5,010	42,000	8.38
Total or average	11,300	90,000	7.98
Fine aggregate (-3/8 inch):			
Stone sand, concrete	395	2,700	6.82
Stone sand, bituminous mix or seal	W	W	7.94
Screening, undesignated	1,800	11,300	6.25
Other fine aggregate	1,050	7,950	7.59
Total or average	3,250	21,900	6.75
Coarse and fine aggregates:			
Graded road base or subbase	7,780	47,200	6.07
Unpaved road surfacing	194	1,470	7.58
Terrazzo and exposed aggregate	W	W	22.28
Crusher run or fill or waste	689	3,460	5.02
Other coarse and fine aggregates	3,000	17,900	5.97
Total or average	11,700	70,000	6.00
Agricultural:			
Agricultural limestone	(3/)	(3/)	5.78
Other agricultural uses	(3/)	(3/)	(3/)
Unspecified: 4/			
Reported	40,400	275,000	6.79
Estimated	1,200	7,800	6.60
Total or average	41,600	282,000	6.79
Grand total or average	69,500	478,000	6.88

W Withheld to avoid disclosing company proprietary data; included with "Other."

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Includes calcareous marl, dolomite, granite, limestone, miscellaneous stone, quartzite, slate, traprock, and volcanic cinder and scoria.

3/ Withheld to avoid disclosing company proprietary data, included in "Grand total."

4/ Reported and estimated production without a breakdown by end use.

TABLE 4
NORTH CAROLINA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3		Unspecified districts	
Use	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Construction:								
Coarse aggregate (+1 1/2 inch) 2/	260	2,040	741	6,890	661	4,630	--	--
Coarse aggregate, graded 3/	2,860	20,200	W	W	W	W	--	--
Fine aggregate (-3/8 inch) 4/	W	W	W	W	W	W	--	--
Coarse and fine aggregate 5/	3,530	22,100	W	W	W	W	--	--
Agricultural 6/	W	W	W	W	--	--	--	--
Unspecified: 7/								
Reported	3,550	31,100	20,900	138,000	15,800	105,000	199	1,313
Estimated	140	950	180	970	860	5,900	--	--
Total	11,300	83,300	35,800	251,000	22,200	142,000	199	1,310

W Withheld to avoid disclosing company proprietary data, included in "Total." -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes filter stone, macadam, riprap and jetty stone, and other coarse aggregate.

3/ Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), railroad ballast, and other graded coarse aggregate.

4/ Includes screening (undesignated), stone sand (bituminous mix or seal), stone sand (concrete), and other fine aggregate.

5/ Includes crusher run (select material or fill), graded road base or subbase, terrazzo and exposed aggregate, unpaved road surfacing, and other coarse and fine aggregates.

6/ Includes agricultural limestone and other agricultural uses.

7/ Reported and estimated production without a breakdown by end use.

TABLE 5
NORTH CAROLINA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	3,200	$11,600	$3.63
Plaster and gunite sands	56	351	6.27
Concrete products (blocks, bricks, pipe, decorative, etc.)	322	1,330	4.12
Asphaltic concrete aggregates and other bituminous mixtures	639	2,230	3.49
Road base and coverings 2/	2,580	10,700	4.14
Road stabilization (lime)	12	57	4.75
Fill	600	1,490	2.49
Railroad ballast	27	59	2.19
Snow and ice control	95	412	4.35
Other miscellaneous uses 3/	301	4,450	14.77
Unspecified: 4/			
Reported	2,310	17,900	7.76
Estimated	1,800	8,500	4.60
Total or average	12,000	59,100	4.93

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Includes road and other stabilization (cement).

3/ Includes filtration and roofing granules.

4/ Reported and estimated production without a breakdown by end use.

TABLE 6
NORTH CAROLINA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products 2/	W	W	W	W	2,480	8,650
Asphaltic concrete aggregate and road base materials 3/	W	W	W	W	2,180	5,410
Railroad ballast	--	--	--	--	27	59
Other miscellaneous uses 4/	801	6,730	1,770	10,200	570	1,600
Unspecified: 5/						
Reported	82	137	1,290	12,600	939	5,190
Estimated	--	--	670	2,500	1,200	5,900
Total	883	6,870	3,720	25,300	7,380	26,800

W Withheld to avoid disclosing company proprietary data; included with "Other miscellaneous uses." -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

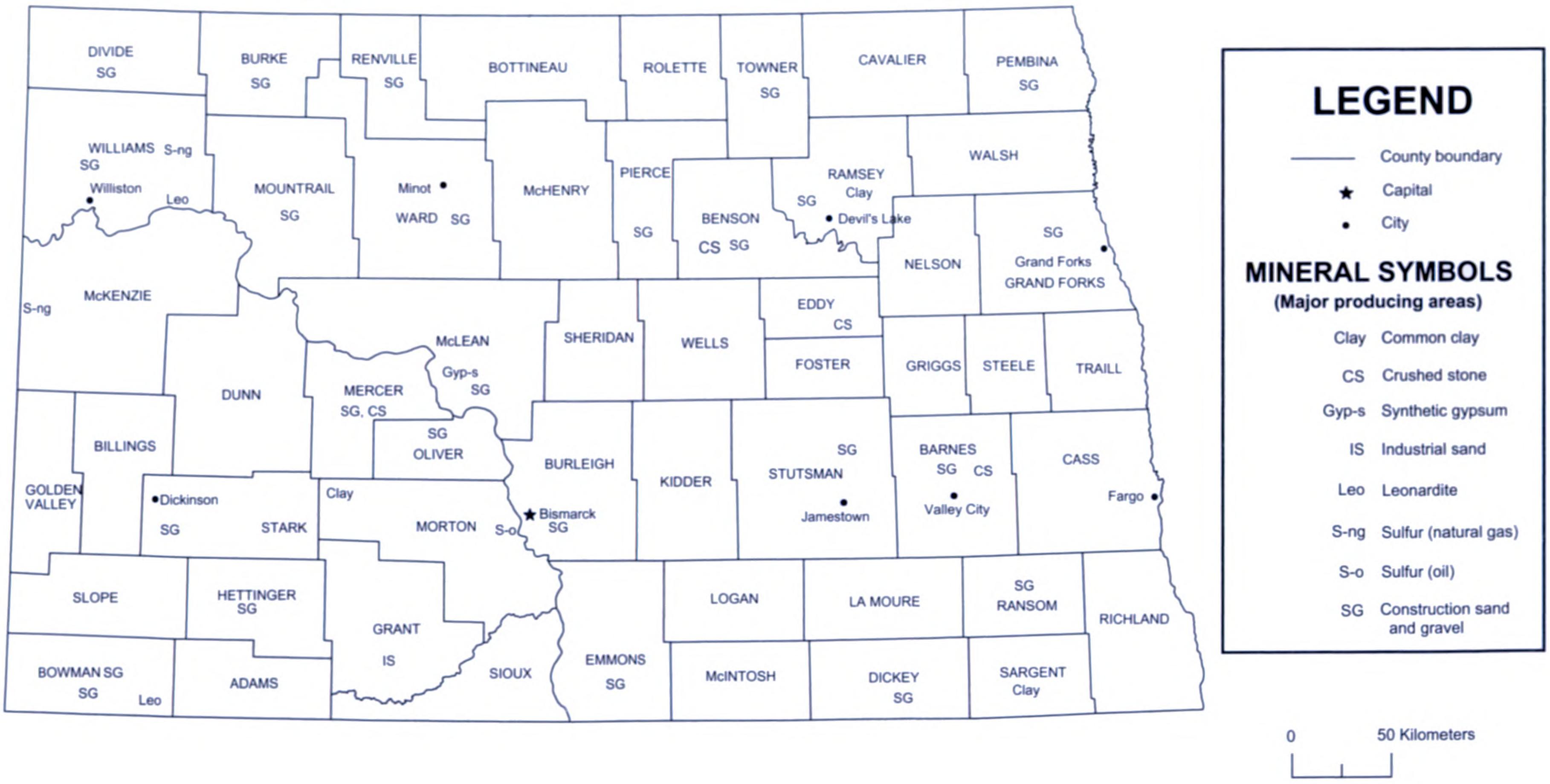
2/ Includes plaster and gunite sands.

3/ Includes road and other stabilization (cement and lime).

4/ Includes fill, filtration, railroad ballast, and snow and ice control.

5/ Reported and estimated production without a breakdown by end use.

NORTH DAKOTA



Source: North Dakota Geological Survey/U.S. Geological Survey (2001)

THE MINERAL INDUSTRY OF NORTH DAKOTA

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the North Dakota Geological Survey for collecting information on all nonfuel minerals.

In 2001, the estimated value[1] of nonfuel mineral production for North Dakota was $39 million, based upon preliminary U.S. Geological Survey (USGS) data. This was about a 12% increase from that of 2000[2] and followed a 13.6% decrease in 2000 from 1999.

In 2001, North Dakota's leading nonfuel mineral by value continued to be construction sand and gravel. This high-volume, low-value commodity accounted for about three-fourths of the State's nonfuel mineral production value. Lime was second by value, and crushed stone was third. In 2000, construction sand and gravel (down $5.2 million) accounted for most of the State's decrease, moderated slightly by a small increase in common clays (table 1).

The following narrative information was provided by the North Dakota Geological Survey[3] (NDGS). During 2001, there were 65 surface mines in operation, as reported to the North Dakota State Soil Conservation Committee (SSCC). (The SSCC collects production data by volume, unlike the USGS, which collects data by mass or metric tons produced.) Based on these reports, 115 hectares (ha) were affected. The quantity of minerals mined included 1.51 million cubic meters of sand and gravel, 1.4 million cubic meters of clay, 24,600 cubic meters (m^3) of scoria, and 5,510 m^3 of crushed stone, totaling 2.94 million cubic meters of mineral material. From 53 pits ranging in size from more than 0.1 ha to 9 ha, a total of about 221,000 m^3 of overburden was disturbed.

Most of the clay mined in North Dakota during this period (about 90%—1.3 million cubic meters) was used to construct dikes and raise roads in the flooded area of Devils Lake. Water levels in this closed-basin lake have risen over 8 meters since 1993 and caused more than $300 million in damages to homes, businesses, and roads. Typically, the Hebron Brick Plant in Morton County is the largest consumer of clay in North Dakota. In 2001, the Hebron Brick Company mined 70,700 m^3 of clay, at least half of which was kaolinite.

Leonardite is an oxidized lignite. Currently, Georesources, Inc. of Williston and American Colloid Co. of Scranton are the only leonardite mining operations in North Dakota. The two companies produced a combined total of approximately 47,500 metric tons (t) of leonardite in 2001. Leonardite is processed and used as a dispersant and viscosity control in oil well drilling muds, as a stabilizer for ion-exchange resins in water treatment, and as a soil conditioner.

The SSCC, as designated by the State legislature, continued to administer the Surface Mining Report Law, which requires any person conducting surface mining operations for minerals other than coal to comply with the reporting requirements of North Dakota Century Code Chapter 38-16. Minerals included under the law are cement rock, clay, gravel, limestone, manganese, molybdenum, peat, potash, pumicite, salt, sand, scoria, sodium sulfate, stone, zeolite, or other minerals (except coal). The SSCC had the regulatory authority to administer the reporting requirement, while the actual regulatory authority for most of these mining activities rests with the NDGS. The law requires that any person or company that within 1 calendar year removes 7,650 m^3 (10,000 cubic yards) or more of earthen materials or products (including overburden) affecting 0.2 ha (0.5 acre) or more in combined mining operations must report the particulars of its surface mining activities. Some operators of smaller operations cooperate by voluntarily submitting summary reports to the SSCC, although they are not required to do so by law. Nevertheless, because not all operations report, the aforementioned summary of surface mining statistics is a conservative estimate of the amount of nonfuel minerals mined in North Dakota in 2001.

The coal gasification plant located near Beulah continued to operate an anhydrous ammonia plant. The plant, in operation since spring 1997, has the capacity to produce 1,200 metric tons/per day (t/d) of anhydrous ammonia. The plant averaged 854 t/d during 2001. Total production of anhydrous ammonia in 2001 was 312,000 t. In 2001, the gasification plant also produced more than 3.1 million liters (ML) of krypton and xenon, approximately 13.3 ML of phenol, 11.2 ML of cresylic acid, 12.8 ML of naptha, and about 1.4 billion liters of nitrogen. Ammonium sulfate production from the stack-gas scrubber in 2001 was more than 120,000 t. In 2001, the plant shipped about 22,400 million standard cubic feet of CO_2 for use in enhanced oil field recovery.

The NDGS continued the process of entering all geologic information from its subsurface mineral program into a computerized database. This information is being used for a number of purposes, including redefining the State's lignite and uranium resources and generating useful information on the State's nonfuel minerals (clay, stone, leonardite, and sand and gravel).

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[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2001 USGS mineral production data published in this chapter are preliminary estimates as of August 2002 and are expected to change. For some mineral commodities, such as construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Specialist contact information may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals/contacts/comdir.html; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2] Values, percentage calculations, and rankings for 2000 may differ from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also change.

[3] Edward C. Murphy, Geologist, authored the text of State mineral industry information provided by the North Dakota Geological Survey.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN NORTH DAKOTA 1/ 2/

(Thousand metric tons and thousand dollars)

Mineral	1999		2000		2001 p/	
	Quantity	Value	Quantity	Value	Quantity	Value
Clays, common	54	W	79	W	79	W
Gemstones	NA	3	NA	3	NA	3
Lime	W	W	176	7,010	175	10,600
Sand and gravel:						
Construction	11,700	33,000	10,600	27,800	10,600	28,200
Industrial	W	W	1	W	1	W
Combined values of peat (1999), stone [crushed stone, crushed limestone, volcanic cinder, miscellaneous (1999- 2000), crushed volcanic cinder and miscellaneous (2001)], and values indicated by symbol W	XX	7,580	XX	410	XX	472
Total	XX	40,600	XX	35,200	XX	39,300

p/ Preliminary. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined values" data. XX Not applicable.

1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/ Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 2
NORTH DAKOTA: CRUSHED STONE SOLD OR USED, BY KIND

Kind	1999				2000			
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone	1	W	W	W	1	W	W	W
Volcanic cinder and scoria	1	W	W	W	2	W	W	W
Miscellaneous stone	5	W	W	W	3	W	W	W
Total or average	XX	W	W	W	XX	W	W	W

W Withheld to avoid disclosing company proprietary data; not included in "Total." XX Not applicable.

TABLE 3
NORTH DAKOTA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Concrete aggregate, graded:			
Bituminous aggregate, coarse	W	W	W
Railroad ballast	W	W	W
Coarse and fine aggregates, graded road base or subbase	W	W	W
Special, other fillers or extenders	W	W	W
Unspecified, reported 2/	W	W	W
Total or average	W	W	W

W Withheld to avoid disclosing company proprietary data; not included in "Total."

1/ Withheld limestone, miscellaneous stone, and volcanic and scoria from total to avoid disclosing company proprietary data.

2/ Reported production without a breakdown by end use.

TABLE 4
NORTH DAKOTA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY MAJOR USE CATEGORY 1/

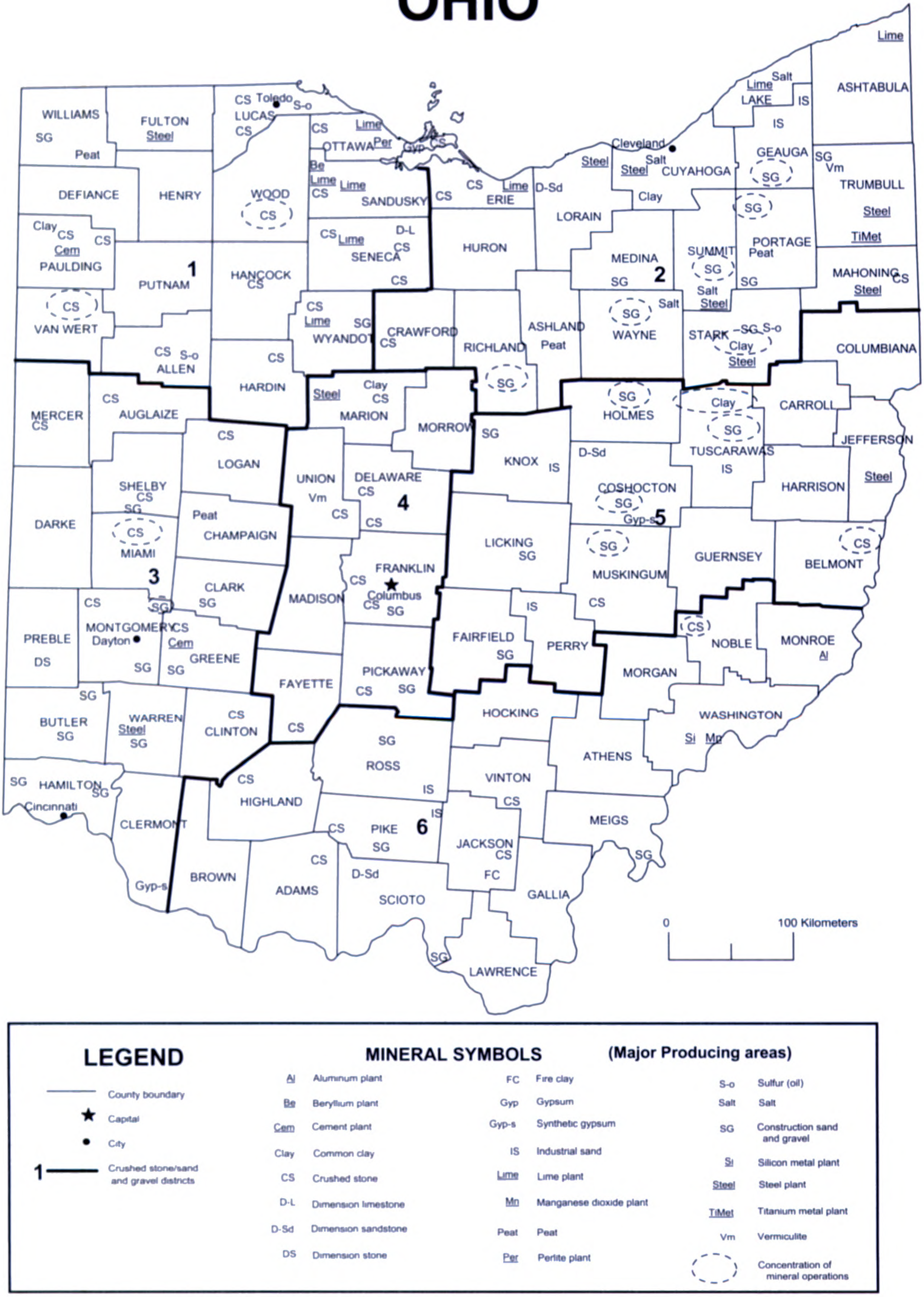
Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate and concrete products	133	$767	$5.77
Asphaltic concrete aggregates and other bituminous mixtures	231	547	2.37
Road base and coverings	4,090	9,020	2.20
Road stabilization (cement)	66	154	2.33
Other miscellaneous uses 2/	162	434	2.68
Unspecified: 3/			
Reported	528	1,450	2.74
Estimated	5,400	15,400	2.85
Total or average	10,600	27,800	2.37

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes fill, snow and ice control, and railroad ballast.

3/ Reported and estimated production without a breakdown by end use.

OHIO



Source: Ohio Division of Geological Survey/U.S. Geological Survey (2001)

THE MINERAL INDUSTRY OF OHIO

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Ohio Department of Natural Resources, Division of Geological Survey, for collecting information on all nonfuel minerals.

In 2001, the estimated value[1] of nonfuel mineral production for Ohio was $1.07 billion, based upon preliminary U.S. Geological Survey (USGS) data. This was about a 7% increase from that of 2000[2] and followed a 3.9% decrease from 1999 to 2000. The State increased in rank to 12th in the Nation (14th in 2000) in total nonfuel mineral production value, of which Ohio accounted for more than 2.5% of the U.S. total.

In 2001, crushed stone by value remained Ohio's leading nonfuel mineral, followed by construction sand and gravel, salt, lime, portland cement, and industrial sand and gravel (descending order of value). Crushed stone and construction sand and gravel alone accounted for about 60% of the State's total nonfuel raw mineral production value. In 2000, the most significant changes were decreases in the values of salt (down more than $30 million), portland cement (down $7.5 million), and gypsum. Except for industrial sand and gravel (up $2 million), all other changes in value were about $1 million or less and had limited effect on the overall total change in value (table 1).

Compared with USGS estimates of the quantities produced in the other 49 States during 2001, Ohio remained second in fire clay, fourth in salt, fifth in construction sand and gravel and common clays, seventh in crushed stone, and ninth in industrial sand and gravel. While the State rose to third from fourth in lime, Ohio was a significant producer of portland and masonry cements and dimension stone. The State's mines exclusively produced industrial minerals and coal; any metals, especially aluminum and steel, produced in the State were processed from materials received from other domestic and foreign sources. In 2001, Ohio continued to be the Nation's second leading raw-steel-manufacturing State with an estimated output of about 14.3 million metric tons (Mt) of raw steel, as reported by the American Iron and Steel Institute. Based upon USGS annual data, the State rose to second from fifth in the production of primary aluminum in 2001.

The Ohio Department of Natural Resources, Division of Geological Survey (DGS), provided the following narrative information.[3] Aggregate production (crushed limestone and dolomite, crushed sandstone and conglomerate, and sand and gravel) continued to be strong in 2001, reaching 128 Mt. Demand for aggregate should remain relatively strong in the short term; long-term forecasts are problematic. The Ohio Department of Transportation (ODOT) proposed budgets for fiscal years 2003 through 2005 indicate a decline from approximately $320 million to $75 million annually for new construction. The Ohio Transportation Review Advisory Council did not allocate any new construction money for 2006. Higher maintenance costs and flat revenues mean that ODOT has less money for new construction and that the Federal transportation law expires in 2003, making it difficult to predict Federal expenditures.

BPB-Celotex (BPB America Inc.) discontinued its gypsum mining and wallboard production in Ottawa County during August 2001 because of increased competition from new facilities in the Midwest that use gypsum produced as a byproduct of flue gas desulfurization. Miller Brothers Construction, Inc., purchased 266 hectares (ha), including mining equipment and the gypsum quarry, from BPB-Celotex in May 2002. Miller Brothers planned to mine the gypsum and byproduct aggregates for the cement, agricultural, and construction industries.

The first comprehensive overhaul of Ohio's industrial minerals regulations since 1974 was signed into law on December 14, 2001. Key provisions of the new law include (1) requiring ground water modeling before a mining permit can be issued, (2) regulation of in-stream and near-stream mining, (3) increasing the term of the mining permit from 10 to 15 years, (4) increasing reclamation bond amounts, and (5) updating blasting requirements.

The Geologic Mapping Group of the Ohio Division of Geological Survey has produced reconnaissance three-dimensional glacial-geology maps at a scale of 1:100,000 for seven 30 x 60 minute quadrangles. The maps depict the type, thickness, lateral extent, and vertical sequence of the glacial deposits and the bedrock lithology immediately beneath. The maps were partially funded by a severance tax on Ohio mineral industries, the USGS National Cooperative Geologic Mapping Program STATEMAP component, and the U.S. Environmental Protection Agency Nonpoint Source Pollution Program. The maps serve many practical purposes including (1) identification of areas underlain by sand and gravel resources, (2) identification of glacial and alluvial clay resources, (3) identification of areas of shallow bedrock (potential limestone, dolomite, and sandstone resources), (4) identification of peat resources, (5) foundation-stability characterization, (6) delineation of areas susceptible to ground water contamination, (7) highway and other land-use planning, and (8) seismic-risk potential mapping.

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[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2001 USGS mineral production data published in this chapter are preliminary estimates as of August 2002 and are expected to change. For some mineral commodities, such as construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Specialist contact information may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals/contacts/comdir.html; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2] Values, percentage calculations, and rankings for 2000 may differ from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also change.

[3] Mark Wolfe, Geologist, authored the text of the State mineral industry information provided by the Ohio Division of Geological Survey.

Public outreach and education continued to be an important component of the mineral industry in Ohio. Several companies hosted open houses that attracted thousands of attendees, participated in the regional meeting of the National Science Teachers Association in Columbus, and cooperated with and partially funded the Ohio's Mineral Industries & the Environment teacher workshops conducted each summer by the Ohio Division of Geological Survey and the University of Akron. Almost 400 teachers have taken these workshops in the past 15 years, and it is estimated that 157,000 students have received information about Ohio' s mineral industries provided by the participants. In another significant public relations endeavor, Hanson Aggregates Midwest cooperated with the city of Sylvania to open the 4-ha Fossil Preserve Park adjacent to its quarry in Lucas County during 2001. This fossil locality in the Devonian age Silica Shale could attract as many as 250,000 visitors per year.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN OHIO 1/ 2/

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral	1999		2000		2001 p/	
	Quantity	Value	Quantity	Value	Quantity	Value
Cement:						
Masonry	W	W	92	11,000 e/	80 e/	9,800 e/
Portland	1,130	90,800 e/	1,030	83,300 e/	1,170 e/	94,200 e/
Clays, common	1,710	8,170	1,370	7,380	1,370	7,380
Gemstones	NA	3	NA	3	NA	3
Lime	1,820	105,000	1,850	106,000	1,720	103,000
Sand and gravel:						
Construction	52,000	257,000	51,200	256,000	55,000	280,000
Industrial	1,150	30,700	1,200	32,800	1,210	32,800
Stone:						
Crushed	73,200	328,000	73,600	327,000	80,000	366,000
Dimension metric tons	25,600	2,390	34,500	3,050	34,000	3,000
Combined values of clays (fire), gypsum (crude), peat, salt, and value indicated by symbol W	XX	220,000	XX	172,000	XX	171,000
Total	XX	1,040,000	XX	999,000	XX	1,070,000

e/ Estimated. p/ Preliminary. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined values" data. XX Not applicable.

1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/ Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 2
OHIO: CRUSHED STONE SOLD OR USED, BY KIND 1/

Kind	1999 r/				2000			
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone 2/	96	63,600	$283,000	$4.45	92	64,000	$284,000	$4.44
Dolomite	13	9,100	42,300	4.65	13	9,130	40,300	4.42
Sandstone	7	506	2,420	4.78	7	459	2,210	4.82
Total or average	XX	73,200	328,000	4.47	XX	73,600	327,000	4.44

XX Not applicable.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes limestone-dolomite reported with no distinction between the two.

TABLE 3
OHIO: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+1 1/2 inch):			
Macadam	W	W	$4.38
Riprap and jetty stone	2,560	$13,700	5.36
Filter stone	135	599	4.44
Other coarse aggregate	708	2,550	3.60
Total or average	3,410	16,900	4.96
Coarse aggregate, graded:			
Concrete aggregate, coarse	3,670	17,800	4.84
Bituminous aggregate, coarse	2,160	11,000	5.08
Bituminous surface-treatment aggregate	570	2,820	4.95
Railroad ballast	203	835	4.11
Other graded coarse aggregate	1,980	11,100	5.62
Total or average	8,580	43,500	5.07
Fine aggregate (-3/8 inch):			
Stone sand, concrete	388	1,700	4.39
Stone sand, bituminous mix or seal	620	2,760	4.45
Screening, undesignated	407	1,580	3.89
Other fine aggregate	279	1,390	4.97
Total or average	1,690	7,430	4.39
Coarse and fine aggregates:			
Graded road base or subbase	12,000	51,800	4.32
Unpaved road surfacing	2,320	9,910	4.27
Crusher run or fill or waste	1,330	5,250	3.95
Other coarse and fine aggregates	11,500	46,500	4.06
Total or average	27,100	113,000	4.19
Other construction materials	1,160	4,870	4.18
Agricultural, agricultural limestone	(3/)	(3/)	4.44
Chemical and metallurgical:			
Cement manufacture	1,460	6,150	4.20
Lime manufacture	(3/)	(3/)	4.39
Dead-burned dolomite manufacture	(3/)	(3/)	4.40
Flux stone	(3/)	(3/)	5.08
Special:			
Asphalt fillers or extenders	(3/)	(3/)	5.26
Whiting or whiting substitute	(3/)	(3/)	12.09
Other fillers or extenders	(3/)	(3/)	5.78
Other miscellaneous uses, refractory stone (including ganister)	(3/)	(3/)	4.06
Unspecified: 4/			
Reported	19,800	88,800	4.48
Estimated	8,700	37,000	4.31
Total or average	28,500	126,000	4.43
Grand total or average	73,600	327,000	4.44

W Withheld to avoid disclosing company proprietary data; included with "Other."

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Includes dolomite, limestone, limestone-dolomite, and sandstone.

3/ Withheld to avoid disclosing company proprietary data; included in "Grand total."

4/ Reported and estimated production without a breakdown by end use.

TABLE 4
OHIO: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3		District 4	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Construction:								
Coarse aggregate (+1 1/2 inch) 2/	2,340	11,600	150	916	179	1,060	558	2,290
Coarse aggregate, graded 3/	3,080	15,500	2,200	11,000	977	4,720	1,900	10,300
Fine aggregate (-3/8 inch) 4/	690	3,190	W	W	163	684	211	831
Coarse and fine aggregate 5/	10,900	44,800	7,550	30,500	3,130	14,000	3,040	12,400
Other construction materials	311	1,310	162	678	512	2,080	47	254
Agricultural 6/	253	1,150	W	W	78	304	17	76
Chemical and metallurgical 7/	W	W	W	W	W	W	--	--
Special 8/	W	W	W	W	W	W	--	--
Other miscellaneous uses 9/	--	--	--	--	--	--	--	--
Unspecified: 10/								
Reported	4,900	23,000	820	3,620	1,920	8,450	7,240	31,900
Estimated	4,900	21,000	920	4,000	840	3,600	1,300	5,600
Total	28,600	127,000	12,500	53,800	8,690	39,400	14,300	63,700

Use	District 5		District 6	
	Quantity	Value	Quantity	Value
Construction:				
Coarse aggregate (+1 1/2 inch) 2/	158	870	16	87
Coarse aggregate, graded 3/	208	1,020	218	1,050
Fine aggregate (-3/8 inch) 4/	173	773	W	W
Coarse and fine aggregate 5/	1,500	6,510	1,020	5,380
Other construction materials	95	340	37	205
Agricultural 6/	W	W	W	W
Chemical and metallurgical 7/	--	--	--	--
Special 8/	--	--	--	--
Other miscellaneous uses 9/	W	W	--	--
Unspecified: 10/				
Reported	114	503	4,850	21,400
Estimated	41	180	660	2,800
Total	2,430	10,700	7,020	32,100

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes filter stone, macadam, riprap and jetty stone, and other coarse aggregate.

3/ Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), railroad ballast, and other graded coarse aggregate.

4/ Includes screening (undesignated), stone sand (bituminous mix or seal), stone sand (concrete), and other fine aggregate.

5/ Includes crusher run (select material or fill), graded road base or subbase, unpaved road surfacing, and other coarse and fine aggregate.

6/ Includes agricultural limestone.

7/ Includes cement manufacture, dead-burned dolomite manufacture, flux stone, and lime manufacture.

8/ Includes asphalt fillers or extenders, whiting or whiting substitute, and other fillers or extenders.

9/ Includes refractory stone (including ganister).

10/ Reported and estimated production without a breakdown by end use.

TABLE 5
OHIO: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	9,350	$43,300	$4.64
Concrete products (blocks, bricks, pipe, decorative, etc.) 2/	788	5,040	6.39
Asphaltic concrete aggregates and other bituminous mixtures	4,220	21,700	5.14
Road base and coverings 3/	2,790	15,100	5.43
Fill	3,610	15,700	4.36
Snow and ice control	76	338	4.45
Filtration	74	449	6.07
Other miscellaneous uses 4/	1,520	9,140	6.03
Unspecified: 5/			
Reported	23,300	117,000	5.03
Estimated	5,400	28,000	5.21
Total or average	51,200	256,000	5.01

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes plaster and gunite sands.

3/ Includes road and other stabilization (cement and lime).

4/ Includes roofing granules.

5/ Reported and estimated production without a breakdown by end use.

TABLE 6
OHIO: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3		District 4		District 5		District 6	
Use	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate (including concrete sand)	298	1,150	3,110	16,500	2,370	9,250	1,310	6,790	1,470	5,750	797	3,870
Concrete products (blocks, bricks, pipe, decorative, etc.) 2/	--	--	263	1,510	365	2,450	W	W	43	190	W	W
Asphaltic concrete aggregate and other bituminous mixtures	W	W	1,370	7,860	877	4,210	W	W	537	2,250	476	2,400
Roadbase and coverings 3/	W	W	685	4,140	539	3,180	574	2,670	841	4,460	W	W
Fill	82	456	938	4,900	1,680	5,620	650	3,490	110	516	150	764
Snow and ice control	--	--	W	W	15	70	W	W	37	147	W	W
Other miscellaneous uses 4/	265	1,140	205	1,280	175	1,210	1,620	9,610	387	1,940	188	1,070
Unspecified: 5/												
Reported	258	951	2,340	12,600	11,200	54,700	2,240	12,000	4,750	24,200	2,540	12,900
Estimated	270	1,200	2,100	12,000	1,700	8,300	--	--	1,300	6,500	17	78
Total	1,170	4,940	11,000	60,800	18,900	89,000	6,400	34,500	9,490	46,000	4,170	21,100

W Withheld to avoid disclosing company proprietary data; included with "Other miscellaneous uses." -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

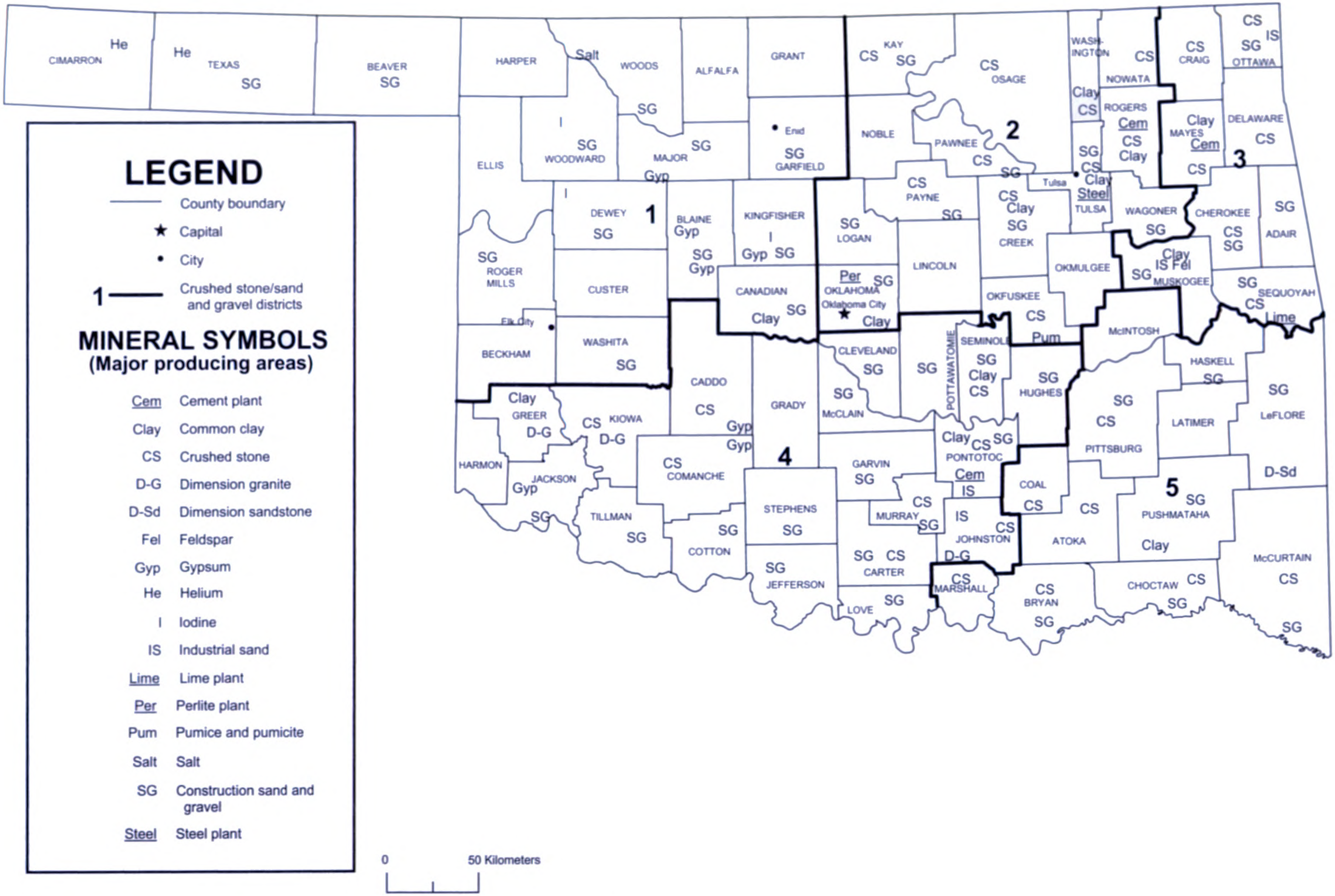
2/ Includes plaster and gunite sands.

3/ Includes road and other stabilization (cement and lime).

4/ Includes filtration and roofing granules.

5/ Reported and estimated production without a breakdown by end use.

OKLAHOMA



Source: Oklahoma Geological Survey/U.S. Geological Survey (2001)

THE MINERAL INDUSTRY OF OKLAHOMA

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Oklahoma Geological Survey for collecting information on all nonfuel minerals.

In 2001, the estimated value[1] of nonfuel raw mineral production for Oklahoma was $530 million, based upon preliminary U.S. Geological Survey (USGS) data. This was a 12% increase from that of 2000[2] and followed a 7.3% increase from 1999 to 2000. The State rose in rank to 28th from 31st among the 50 States in total nonfuel mineral production value, of which Oklahoma accounted for nearly 1.5% of the U.S. total.

In 2001, crushed stone continued to be Oklahoma's leading nonfuel mineral commodity, accounting for about two-fifths of the State's total nonfuel mineral production value. Based upon value, crushed stone was followed by cement (masonry and portland), construction sand and gravel, industrial sand and gravel, gypsum, and iodine. The combined values of three of Oklahoma's four major construction materials—crushed stone, construction sand and gravel, and gypsum (descending order of value)—accounted for more than 50% of the total value. Further information regarding portland cement is withheld to protect company proprietary data.

In 2000, increases in crushed stone (up $23 million), portland cement (up more than $14 million), and gypsum (up $3.4 million) led the State's increase for the year, moderated somewhat by decreases in the values of construction sand and gravel, iodine, and lime. All other nonfuel minerals had changes in value of less than $1 million (table 1).

Oklahoma's mines exclusively produced industrial minerals; no metals were mined in the State. Based upon USGS estimates of the quantities produced in the 50 States during 2001, Oklahoma remained the only State that produced iodine and continued to be first in gypsum, second of 4 States that produce tripoli, third of 3 States in crude helium, and fifth in feldspar. The State rose in rank to seventh from eighth in industrial sand and gravel and was a significant producer of crushed stone, masonry and portland cements, construction sand and gravel, common clays, dimension stone, and gemstones (descending order of value).

The narrative information that follows was provided by the Oklahoma Geological Survey[3] (OGS). Production data in the text that follows are those reported by the OGS based upon that agency's own surveys and estimates. Data may differ from some production figures or other data as reported to the USGS.

In April 2001, Martin Marietta Materials Inc. acquired Meridian Aggregates Co. for $235 million. Meridian operates eight stone quarries and sales yards in five counties in Oklahoma, the largest being at Mill Creek in Johnston County. Martin Marietta Materials Inc. acquired Material Producers Inc. of Norman, OK, in June 2001. Material Producers operates a limestone quarry near Davis, OK, serving the Norman and Oklahoma City areas, and has an annual capacity of about 1.5 million metric tons (Mt), with reserves in excess of 85 Mt. Three affiliated companies operated by Material Producers also were included in the deal: Norman Asphalt operates an asphalt plant, Norman Concrete runs a ready mixed concrete plant, and Tri-Mat is a trucking company.

Texas Industries, Inc. (TXI) of Dallas, TX began construction on its aggregate operation in Johnston County near Mill Creek, OK, in 2001. The 9-million-metric-ton-per-year-capacity plant was scheduled for completion in 2002. The TXI green field operation will produce crushed limestone for the regional aggregate market. In Tulsa County, Watkins Sand Co. began operating its Cardinal sand and gravel dredging operation in the Arkansas River in December 2001. In Rogers County, Sherwood Construction Co. of Catoosa, OK, began operating its Greenhill quarry, mining limestone for the aggregate market.

In July 2001, Lafarge S.A. became the world's largest maker of cement when it purchased Blue Circle Industries PCL. As a result of the acquisition, the Blue Circle, Inc. cement plant in Tulsa, OK, became part of Lafarge.

In April 2000, several business leaders in the Oklahoma aggregates industry created the Oklahoma Aggregate Association (OKAA), which incorporated in July 2001. It provides a medium for the members to coordinate their efforts to discuss and resolve issues of common concern and interest in the State. The OKAA addresses issues related to aggregates, construction material producers, dimension stone, and other allied industries. The scope of the issues addressed includes governmental affairs/environmental/safety, industry promotion and marketing, public image—internal and external communications, increasing membership, specifications, and production. Additional information about the OKAA is available on the Internet at URL http://www.okaa.org.

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[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2001 USGS mineral production data published in this chapter are preliminary estimates as of August 2002 and are expected to change. For some mineral commodities, such as construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Specialist contact information may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals/contacts/comdir.html; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2] Values, percentage calculations, and rankings for 2000 may differ from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also change.

[3] Stanley T. Krukowski, Industrial Minerals Geologist with the Oklahoma Geological Survey, authored the text of the State mineral industry information provided by that agency.

The Oklahoma Geological Survey (OGS) continued its geologic mapping of the State in cooperation with the USGS under the STATEMAP component of the USGS National Cooperative Geologic Mapping Program. Selected areas are mapped in detail at 1:24,000 scale (7.5-minute topographic quadrangles). Statewide, the geologic mapping program will continue on a regional basis at a 1:100,000 scale; this supplants previously published 1:250,000 scale maps. Work on the following 7.5-minute quadrangles was completed in 2001: Franklin, Moore, Oklahoma City SE, and Oklahoma City SW. The Buffalo, OK, 1:100,000-scale map also was completed in 2001. The focus of the geologic mapping program include associated environmental, engineering, and natural resource issues. In addition, the OGS increased its attention on its industrial minerals program by creating the industrial minerals geologist position in 2000-01. The program's goal is to provide more information to the public about the scope of industrial minerals geology and the role and potential of industrial minerals development within the State.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN OKLAHOMA 1/ 2/

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral		1999		2000		2001 p/	
		Quantity	Value	Quantity	Value	Quantity	Value
Clays, common		757	2,050	757	2,060	757	2,060
Gemstones		NA	268	NA	197	NA	197
Gypsum, crude		3,510	20,100	2,830	23,500	2,650	23,300
Iodine, crude	metric tons	1,620	23,800	1,470	21,500	1,710	20,900
Sand and gravel:							
Construction		10,200	41,200	9,210	35,500	10,100	39,500
Industrial		1,470	30,900	1,480	30,700	1,480	30,700
Stone:							
Crushed		36,200 r/	145,000 r/	39,300	168,000	49,000	216,000
Dimension	metric tons	3,480	635	5,910	1,530	6,000	1,500
Combined values of cement, feldspar, helium, lime, salt, tripoli		XX	177,000	XX	180,000	XX	187,000
Total		XX	441,000	XX	473,000	XX	530,000

r/ Revised. p/ Preliminary. NA Not available. XX Not applicable.
1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).
2/ Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 2
OKLAHOMA: CRUSHED STONE SOLD OR USED, BY KIND 1/

Kind	1999				2000			
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone	42	28,000	$111,000	$3.98	41	31,200	$134,000	$4.28
Dolomite	3	W	W	3.31	3	1,460	5,000	3.42
Granite	5	3,680	16,400	4.47	5	3,850	14,300	3.71
Sandstone	8	2,470	10,800	4.36	7	2,510	14,400	5.73
Shell	--	--	--	--	1	W	W	3.50
Miscellaneous stone	2	W	W	1.79	2	W	W	3.71
Total or average	XX	36,200 r/	145,000 r/	4.00	XX	39,300	168,000	4.28

r/ Revised. W Withheld to avoid disclosing company proprietary data; included in "Total." XX Not applicable. -- Zero.
1/ Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 3
OKLAHOMA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit Value
Construction:			
Coarse aggregate (+1 1/2 inch):			
Riprap and jetty stone	428	$2,730	$6.39
Filter stone	25	176	7.04
Other coarse aggregate	475	1,660	3.50
Total or average	928	4,570	4.93
Coarse aggregate, graded:			
Concrete aggregate, coarse	1,700	10,200	6.01
Bituminous aggregate, coarse	842	5,240	6.23
Bituminous surface-treatment aggregate	568	4,820	8.49
Railroad ballast	W	W	4.30
Other graded coarse aggregate	9,180	37,800	4.12
Total or average	12,300	58,100	4.73
Fine aggregate (-3/8 inch):			
Stone sand, concrete	W	W	4.13
Stone sand, bituminous mix or seal	157	742	4.73
Screening, undesignated	2,820	11,500	4.06
Other fine aggregate	1,330	5,110	3.84
Total or average	4,310	17,300	4.02
Coarse and fine aggregates:			
Graded road base or subbase	1,780	8,360	4.71
Unpaved road surfacing	650	3,290	5.06
Crusher run or fill or waste	3,220	13,800	4.29
Other coarse and fine aggregates	1,370	5,160	3.78
Total or average	7,010	30,600	4.37
Other construction materials 3/	1,250	5,380	4.32
Agricultural, limestone	(4/)	(4/)	3.47
Chemical and metallurgical:			
Cement manufacture	(4/)	(4/)	4.66
Flux stone	(4/)	(4/)	4.70
Unspecified: 5/			
Reported	6,230	23,800	3.82
Estimated	4,900	18,000	3.57
Total or average	11,200	41,400	3.71
Grand total or average	39,300	168,000	4.28

W Withheld to avoid disclosing company proprietary data; included with "Other."

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes dolomite, granite, limestone, miscellaneous stone, sandstone, and shell.

3/ Includes building products.

4/ Withheld to avoid disclosing company proprietary data; included in "Grand total."

5/ Reported and estimated production without a breakdown by end use.

TABLE 4
OKLAHOMA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE AND DISTRICT 1/ 2/

(Thousand metric tons and thousand dollars)

	District 2		District 3		District 4		District 5	
Use	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Construction:								
Coarse aggregate (+1 1/2 inch) 3/	161	1,270	42	230	W	W	W	W
Coarse aggregate, graded 4/	W	W	W	W	7,950	31,400	2,220	13,200
Fine aggregate (-3/8 inch) 5/	W	W	W	W	3,170	12,700	522	2,080
Coarse and fine aggregate 6/	2,270	11,600	416	1,760	2,370	9,320	1,950	7,940
Other construction materials 7/	--	--	80	442	997	4,120	169	817
Agricultural 8/	W	W	W	W	--	--	W	W
Chemical and metallurgical 9/	W	W	--	--	W	W	W	W
Unspecified: 10/								
Reported	4,080	15,800	2,150	8,010	--	--	--	--
Estimated	62	210	890	3,000	1,800	6,900	2,200	7,500
Total	9,550	44,900	4,290	17,700	18,000	72,000	7,560	33,800

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

1/ No production reported in District 1.

2/ Data are rounded to no more than three significant digits; may not add to totals shown.

3/ Includes filter stone, riprap and jetty stone, and other coarse aggregate.

4/ Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), railroad ballast, and other graded coarse aggregate.

5/ Includes screening (undesignated), stone sand (bituminous mix or seal), stone sand (concrete), and other fine aggregate.

6/ Includes crusher run (select material or fill), graded road base or subbase, unpaved road surfacing, and other coarse and fine aggregates.

7/ Includes building products.

8/ Includes agricultural limestone.

9/ Includes cement manufacture and flux stone.

10/ Reported and estimated production without a breakdown by end use.

TABLE 5
OKLAHOMA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	4,660	$18,700	$4.01
Concrete products (blocks, bricks, pipe, decorative, etc.) 2/	46	232	5.04
Asphaltic concrete aggregates and other bituminous mixtures	278	734	2.64
Road base and coverings	209	530	2.54
Fill	1,030	1,780	1.72
Other miscellaneous uses	107	1,140	10.62
Unspecified: 3/			
Reported	1,110	4,520	4.06
Estimated	1,800	7,900	4.06
Total or average	9,210	35,500	3.85

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Includes plaster and gunite sands.

3/ Reported and estimated production without a breakdown by end use.

TABLE 6
OKLAHOMA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

	District 1		District 2	
Use	Quantity	Value	Quantity	Value
Concrete aggregate (including concrete sand) 2/	715	1,960	1,910	6,510
Concrete products (blocks, bricks, pipe, decorative, etc.)	--	--	42	214
Asphaltic concrete aggregates and other bituminous mixtures	W	W	166	414
Road base and coverings	W	W	--	--
Fill	122	198	664	1,190
Other miscellaneous uses	205	765	11	42
Unspecified: 3/				
Reported	--	--	458	1,110
Estimated	440	2,200	250	860
Total	1,480	5,160	3,500	10,300

	Districts 3 and 5 4/		District 4	
	Quantity	Value	Quantity	Value
Concrete aggregate (including concrete sand) 2/	184	868	1,850	9,350
Concrete products (blocks, bricks, pipe, decorative, etc.)	--	--	--	--
Asphaltic concrete aggregates and other bituminous mixtures	W	W	8	18
Road base and coverings	W	W	51	85
Fill	78	171	167	218
Other miscellaneous uses	120	584	33	491
Unspecified: 3/				
Reported	6	22	650	3,390
Estimated	460	2,300	630	2,500
Total	844	3,970	3,390	16,000

W Withheld to avoid disclosing company proprietary data; included with "Other miscellaneous uses." -- Zero.

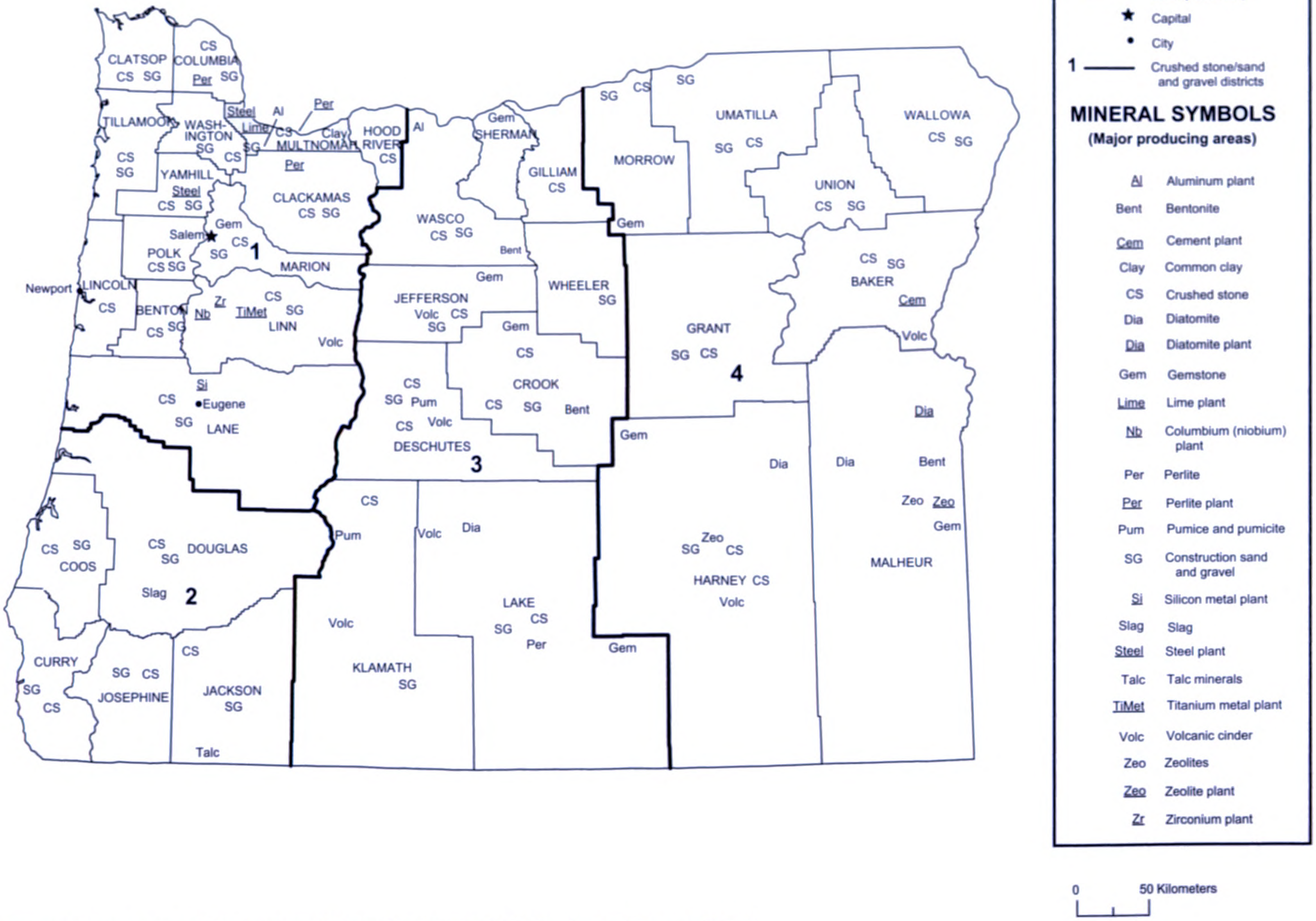
1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes plaster and gunite sands.

3/ Reported and estimated production without a breakdown by end use.

4/ Districts 3 and 5 are combined to avoid disclosing company proprietary data.

OREGON



Source: Oregon Department of Geology and Mineral Industries/U.S. Geological Survey (2001)

THE MINERAL INDUSTRY OF OREGON

In 2001, the estimated value[1] of nonfuel mineral production for Oregon was $326 million, based upon preliminary U.S. Geological Survey (USGS) data. This was a 9% increase from that of 2000[2] and followed a 6% decrease from 1999 to 2000. The State was 36th in rank among the 50 States in total nonfuel mineral production value, of which Oregon accounted for about 1% of the U.S. total.

Industrial minerals accounted for all of Oregon's nonfuel raw mineral and material production. In 2001, construction sand and gravel and crushed stone (1st in 2000), by value, remained Oregon's two leading nonfuel mineral commodities, followed by portland cement, diatomite, and lime (descending order of value). The former two accounted for nearly 65% of the State's total nonfuel mineral value, while all five combined represented about 96% of the State's total raw nonfuel mineral economy. In 2000, crushed stone (down $12 million), construction sand and gravel (down $8 million), and portland cement (down about $2 million) had the largest decreases for the year, which were offset somewhat by increases in lime (up more than $3 million), perlite, and common clays (descending order of change) (table 1).

Based upon USGS estimates of the quantities of raw minerals produced in the United States during 2001, Oregon remained first among six States that produce pumice and pumicite, second in perlite, third in diatomite and zeolites, and fifth in talc. The State rose in rank to fourth from seventh in gemstones (by value) and produced significant quantities of construction sand and gravel and crushed stone (descending order of value). Emery production in Oregon was very low during 2000 and 2001 because the Nation's sole emery producer was limited in its ability to operate its claims beginning in 2000 owing to a long forest fire season. Raw steel was produced in Oregon but was processed from materials obtained from other domestic and foreign sources. Aluminum had been similarly produced up until 2001. Production ceased by the end of 2000 owing to escalated energy costs in the western and northwestern United States; in 2000, Oregon had ranked 13th of 14 primary aluminum-producing States.

The following narrative information was provided by the Oregon Department of Geology and Mineral Industries.[3] No new discoveries were announced, and no major exploration programs were in progress in Oregon in 2001. Development and permitting activity continued on some precious-metal deposits in Baker County, on silica deposits in Douglas and Jackson Counties, and on diatomite and zeolite properties in Malheur County, but no new production was initiated.

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[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2001 USGS mineral production data published in this chapter are preliminary estimates as of August 2002 and are expected to change. For some mineral commodities, such as construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Specialist contact information may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals/contacts/comdir.html; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2] Values, percentage calculations, and rankings for 2000 may vary from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also change.

[3] Ronald Geitgey, Economic/Industrial Minerals Geologist with the Oregon Department of Geology and Mineral Industries, authored the text of the State mineral industry information provided by that agency.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN OREGON 1/ 2/

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral	1999		2000		2001 p/	
	Quantity	Value	Quantity	Value	Quantity	Value
Clays, common	240	77	227	632	227	633
Gemstones	NA	949	NA	856	NA	1,200
Sand and gravel, construction	16,900	105,000	16,500	97,000	19,000	114,000
Stone, crushed	23,300	111,000	20,800	98,900	19,800	96,900
Zeolites metric tons	(3/)	NA	(3/)	NA	(3/)	NA
Combine value of cement (portland), clays (bentonite), diatomite, emery (1999), lime, perlite (crude), pumice and pumicite, talc (crude)	XX	101,000	XX	102,000	XX	113,000
Total	XX	318,000	XX	299,000	XX	326,000

p/ Preliminary. NA Not available. XX Not applicable.

1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/ Data are rounded to no more than three significant digits; may not add to totals shown.

3/ Withheld to avoid disclosing company proprietary data.

TABLE 2
OREGON: CRUSHED STONE SOLD OR USED, BY KIND 1/

Kind	1999				2000			
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone	2	W	W	W	2	W	W	W
Granite	27	421	$1,650	$3.92	6	W	W	$4.06
Calcareous marl	1	113	36	0.32	1	100	$338	3.38
Sandstone	1	14	62	4.43	--	--	--	--
Shell	1	W	W	W	1	W	W	W
Traprock	228 r/	19,600 r/	94,600 r/	4.83 r/	167	17,500	82,800	4.74
Volcanic cinder and scoria	2	W	W	W	3	W	W	W
Miscellaneous stone	32 r/	1,750 r/	6,790 r/	3.89 r/	34	1,680	7,730	4.59
Total or average	XX	23,300	111,000	4.75	XX	20,800	98,900	4.75

r/ Revised. W Withheld to avoid disclosing company proprietary data; included in "Total." XX Not applicable. -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 3
OREGON: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+1 1/2 inch):			
Macadam	251	$882	$3.51
Riprap and jetty stone	188	1,010	5.37
Filter stone	71	299	4.21
Other coarse aggregate	747	4,080	5.46
Total or average	1,260	6,270	4.98
Coarse aggregate, graded:			
Concrete aggregate, coarse	222	1,210	5.45
Bituminous aggregate, coarse	796	3,560	4.48
Bituminous surface-treatment aggregate	72	444	6.17
Railroad ballast	209	866	4.14
Other graded coarse aggregate	106	633	5.97
Total or average	1,410	6,720	4.78
Fine aggregate (-3/8 inch):			
Stone sand, concrete	W	W	7.26
Stone sand, bituminous mix or seal	159	734	4.62
Screening, undesignated	50	187	3.74
Other fine aggregate	98	805	8.21
Total or average	307	1,730	5.62
Coarse and fine aggregates:			
Graded road base or subbase	4,730	24,900	5.26
Unpaved road surfacing	825	3,700	4.48
Crusher run or fill or waste	708	3,070	4.33
Other coarse and fine aggregates	1,510	7,010	4.63
Total or average	7,780	38,700	4.97
Other construction materials	120	454	3.78
Chemical and metallurgical, cement manufacture	(3/)	(3/)	3.61
Other miscellaneous uses, sugar refining	(3/)	(3/)	12.97
Unspecified: 4/			
Reported	4,490	19,900	4.43
Estimated	4,000	18,000	4.48
Total or average	8,480	37,800	4.45
Grand total or average	20,800	98,900	4.75

W Withheld to avoid disclosing company proprietary data; included with "Other."

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Includes calcareous marl, granite, limestone, miscellaneous stone, shell, traprock, andvolcanic cinder and scoria.

3/ Withheld to avoid disclosing company proprietary data; included in "Grand total."

4/ Reported and estimated production without a breakdown by end use.

TABLE 4
OREGON: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3		District 4		Unspecified districts	
Use	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Construction:										
Coarse aggregate (+1 1/2 inch) 2/	594	2,820	606	3,210	W	W	W	W	8	42
Coarse aggregate, graded 3/	665	3,550	W	W	W	W	319	1,370	--	--
Fine aggregate (-3/8 inch) 4/	163	1,150	W	W	--	--	W	W	--	--
Coarse and fine aggregate 5/	4,450	24,200	1,390	6,450	467	2,700	699	2,660	771	2,660
Other construction materials	94	338	26	116	--	--	--	--	--	--
Chemical and metallurgical 6/	--	--	--	--	--	--	W	W	--	--
Other miscellaneous uses 7/	--	--	--	--	--	--	W	W	--	--
Unspecified: 8/										
Reported	3,410	15,100	7	31	212	943	17	74	841	3,750
Estimated	3,300	15,000	340	1,500	320	1,400	--	--	--	--
Total	12,700	62,100	2,800	13,100	1,020	5,260	2,660	12,000	1,620	6,450

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes filter stone, macadam, riprap and jetty stone, and other coarse aggregate.

3/ Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), railroad ballast, and other graded coarse aggregate.

4/ Includes screening (undesignated), stone sand (bituminous mix or seal), stone sand (concrete), and other fine aggregate.

5/ Includes crusher run (select material or fill), graded road base or subbase, unpaved road surfacing, and other coarse and fine aggregates.

6/ Includes cement manufacture.

7/ Includes sugar refining.

8/ Reported and estimated production without a breakdown by end use.

TABLE 5
OREGON: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate and concrete products 2/	3,370	$20,700	$6.15
Asphaltic concrete aggregates and other bituminous mixtures	1,610	12,000	7.46
Road base and coverings 3/	4,570	28,400	6.23
Fill	956	3,460	3.62
Other miscellaneous uses 4/	416	1,880	4.51
Unspecified: 5/			
Reported	2,350	13,000	5.54
Estimated	3,200	17,000	5.45
Total or average	16,500	97,000	5.89

1/ Data are rounded to no more than three significant digits may not add to totals shown.

2/ Includes plaster and gunite sands.

3/ Includes road and other stabilization (cement and lime).

4/ Includes railroad ballast and snow and ice control.

5/ Reported and estimated production without a breakdown by end use.

TABLE 6
OREGON: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregates and concrete products 2/	2,490	14,600	577	4,620	49	434
Asphaltic concrete aggregates and other bituminous mixtures	1,140	8,130	W	W	W	W
Road base and coverings 3/	3,620	22,900	278	2,200	W	W
Fill	754	2,570	W	W	W	W
Other miscellaneous uses 4/	398	1,760	492	3,900	411	2,600
Unspecified: 5/						
Reported	1,970	12,300	(6/)	(6/)	15	25
Estimated	2,000	10,000	430	2,200	300	2,000
Total	12,400	72,700	1,780	12,900	771	5,020

	District 4		Unspecified districts	
	Quantity	Value	Quantity	Value
Concrete aggregates and concrete products 2/	257	1,090	--	--
Asphaltic concrete aggregates and other bituminous mixtures	W	W	--	--
Road base and coverings 3/	378	1,500	--	--
Fill	W	W	9	11
Other miscellaneous uses 4/	65	226	--	--
Unspecified: 5/				
Reported	--	--	370	669
Estimated	470	2,800	--	--
Total	1,170	5,650	379	680

W Withheld to avoid disclosing company proprietary data; included with "Other miscellaneous uses." -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes plaster and gunite sands.

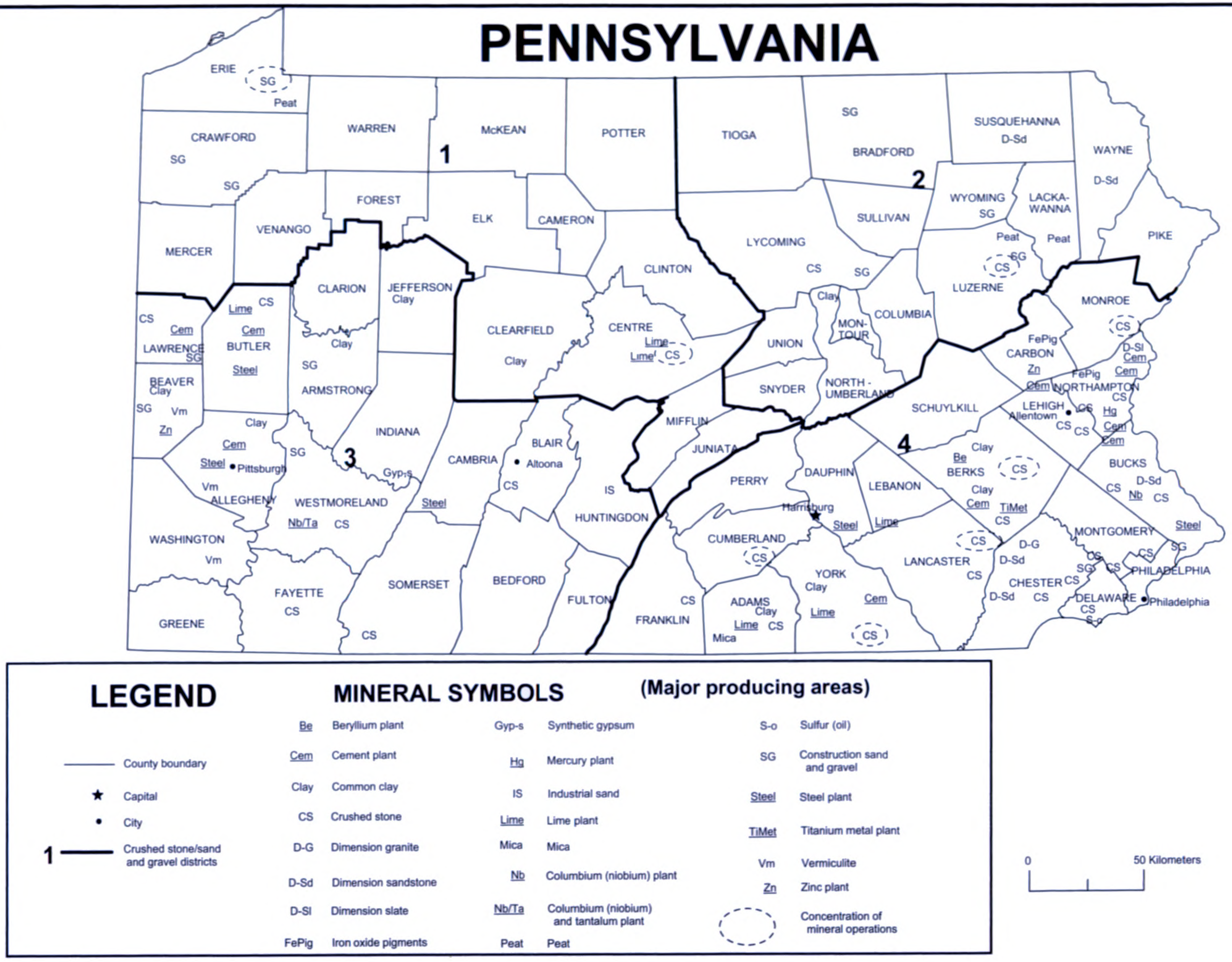
3/ Includes road and other stabilization (cement and lime).

4/ Includes railroad ballast and snow and ice control.

5/ Reported and estimated production without a breakdown by end use.

6/ Less than ½ unit.

PENNSYLVANIA



Source: Pennsylvania Bureau of Topographic and Geologic Survey/U.S. Geological Survey (2001)

THE MINERAL INDUSTRY OF PENNSYLVANIA

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Pennsylvania Bureau of Topographic and Geologic Survey for collecting information on all nonfuel minerals.

In 2001, the estimated value[1] of nonfuel mineral production for Pennsylvania was $1.27 billion, based upon preliminary U.S. Geological Survey (USGS) data. This was about a 2% increase from that of 2000.[2] For the sixth consecutive year, the State was 11th in the Nation in total nonfuel mineral production value, of which Pennsylvania accounted for more than 3% of the U.S. total. (Data for industrial sand and gravel and tripoli have been withheld from table 1 to protect company proprietary data, resulting in total values that are less than the actual totals for those years.)

In 2001, Pennsylvania continued to be among the Nation's leading States that produce crushed stone, cement (portland and masonry), and lime (descending order of value); these commodities accounted for nearly 90% of the State's total nonfuel mineral production value. Construction sand and gravel, Pennsylvania's other major nonfuel mineral, accounted for most of the remaining 10%. In 2000, an increase in the production and value of crushed stone, up $35 million, accounted for nearly all of the increase in the State's nonfuel minerals economy. Common clay was also up slightly. This was offset by a combined total of about $11 million by decreases in the values of cement (portland and masonry) and construction sand and gravel. Smaller decreases also occurred in dimension stone and lime (table 1).

Based upon USGS estimates of the quantities produced in the 50 States in 2001, Pennsylvania remained second in crushed stone, third in portland cement, fourth of 4 States that produce tripoli, sixth in lime and masonry cement, and rose to eighth from ninth in dimension stone. Additionally, significant quantities of construction sand and gravel, industrial sand and gravel, and common clays were produced in the State (descending order of value).

Pennsylvania is exclusively an industrial mineral- and coal-producing State; metals that were produced in the State in 2001 were processed from materials acquired from foreign and other domestic sources. Pennsylvania ranked fourth in the Nation (third in 2000) in the production of raw steel, with an output of 5.22 million metric tons of raw steel, as reported by the American Iron and Steel Institute.

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[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2001 USGS mineral production data published in this chapter are preliminary estimates as of August 2002 and are expected to change. For some mineral commodities, such as construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Specialist contact information may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals/contacts/comdir.html; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2] Values, percentage calculations, and rankings for 2000 may differ from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also change.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN PENNSYLVANIA 1/ 2/

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral	1999		2000		2001 p/	
	Quantity	Value	Quantity	Value	Quantity	Value
Cement:						
Masonry	330	35,800 e/	324	33,700 e/	330 e/	34,400 e/
Portland	6,690	479,000 e/	6,640	475,000 e/	6,660 e/	477,000 e/
Clays, common	816	1,760	840	1,870	840	1,870
Gemstones	NA	1	NA	1	NA	1
Lime	1,340	94,300	1,350	93,900	1,220	74,600
Peat	6	185	6	183	6	171
Sand and gravel:						
Construction	18,600	115,000	17,900	110,000	20,100	125,000
Industrial	W	(3/)	W	(3/)	W	(3/)
Stone:						
Crushed	91,300 r/	485,000 r/	97,900	520,000	101,000	553,000
Dimension metric tons	50,800	12,600	49,500	12,100	40,000	6,230
Tripoli	W	(3/)	W	(3/)	W	(3/)
Total	XX	1,220,000	XX	1,250,000	XX	1,270,000

e/ Estimated. p/ Preliminary. r/ Revised. NA Not available. W Withheld to avoid disclosing company proprietary data. XX Not applicable.

1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/ Data are rounded to no more than three significant digits; may not add to totals shown.

3/ Value excluded to avoid disclosing company proprietary data.

TABLE 2
PENNSYLVANIA: CRUSHED STONE SOLD OR USED, BY KIND 1/

Kind	1999				2000			
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone 2/	119 r/	55,800 r/	$293,000 r/	$5.25 r/	119	60,300	$319,000	$5.30
Dolomite	13 r/	10,800 r/	61,700 r/	5.71 r/	12	11,800	63,800	5.39
Granite	8 r/	5,480 r/	28,300 r/	5.17 r/	8	4,700	24,300	5.17
Marble	2	W	W	W	2	W	W	W
Sandstone and quartzite	40 r/	7,680 r/	40,500 r/	5.27 r/	44	9,130	49,500	5.42
Traprock	10	3,840	19,500	5.07	10	4,630	23,400	5.06
Slate	1	W	W	W	1	W	W	W
Miscellaneous stone	16 r/	6,810 r/	36,000 r/	5.29 r/	14	6,420	34,400	5.36
Total or average	XX	91,300 r/	485,000 r/	5.31 r/	XX	97,900	520,000	5.32

r/ Revised. W Withheld to avoid disclosing company proprietary data; included in "Total." XX Not applicable.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes "limestone-dolomite" reported with no distinction between the two.

TABLE 3
PENNSYLVANIA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+1 1/2 inch):			
Macadam	W	W	$6.01
Riprap and jetty stone	1,300	$9,190	7.07
Filter stone	360	2,070	5.76
Other coarse aggregate	1,000	6,050	6.01
Total or average	2,670	17,300	6.49
Coarse aggregate, graded:			
Concrete aggregate, coarse	3,430	20,500	5.98
Bituminous aggregate, coarse	5,430	33,600	6.18
Bituminous surface-treatment aggregate	1,340	8,610	6.43
Railroad ballast	739	3,620	4.90
Other graded coarse aggregate	3,220	18,700	5.83
Total or average	14,200	85,000	6.01
Fine aggregate (-3/8 inch):			
Stone sand, concrete	1,500	9,300	6.19
Stone sand, bituminous mix or seal	2,190	12,600	5.73
Screening, undesignated	880	5,170	5.88
Other fine aggregate	1,870	12,500	6.67
Total or average	6,450	39,500	6.13
Coarse and fine aggregates:			
Graded road base or subbase	6,960	35,800	5.14
Unpaved road surfacing	1,170	6,610	5.64
Terrazzo and exposed aggregate	97	690	7.11
Crusher run or fill or waste	1,530	6,710	4.38
Roofing granules	W	W	4.95
Light weight aggregate (slate)	W	W	5.88
Other coarse and fine aggregates	6,900	33,400	4.85
Total or average	16,700	83,200	5.00
Other construction materials	284	1,770	6.23
Agricultural:			
Agricultural limestone	503	5,230	10.39
Poultry grit and mineral food	59	294	4.98
Chemical and metallurgical:			
Cement manufacture	7,020	33,500	4.77
Lime manufacture	(3/)	(3/)	5.03
Flux stone	2	15	7.50
Sulfur oxide removal	250	1,710	6.83
Special:			
Mine dusting or acid water treatment	2	9	4.50
Asphalt fillers or extenders	706	5,670	8.04
Whiting or whiting substitute	248	7,270	29.31
Other fillers or extenders	208	1,590	7.63
Other miscellaneous uses and specified uses not listed	4	32	8.00
Unspecified: 4/			
Reported	30,700	154,000	5.02
Estimated	16,000	76,000	4.65
Total or average	47,100	230,000	4.89
Grand total or average	97,900	520,000	5.32

W Withheld to avoid disclosing company proprietary data; included with "Other."

1/ Data are rounded to three significant digits, except unit value; may not add to totals shown.

2/ Includes dolomite, granite, limestone, limestone-dolomite, marble, miscellaneous stone, sandstone and quartzite, slate, and traprock.

3/ Withheld to avoid disclosing company proprietary data; included in "Grand total."

4/ Reported and estimated production without a breakdown by end use.

TABLE 4
PENNSYLVANIA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3		District 4	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Construction:								
Coarse aggregate (+1 1/2 inch) 2/	W	W	248	1,410	W	W	W	W
Coarse aggregate, graded 3/	W	W	W	W	4,290	26,900	8,450	50,600
Fine aggregate (-3/8 inch) 4/	W	W	W	W	1,930	11,300	3,590	23,500
Coarse and fine aggregate 5/	W	W	W	W	4,190	21,100	10,900	55,100
Other construction materials	--	--	16	78	178	1,080	91	610
Agricultural 6/	--	--	W	W	W	W	W	W
Chemical and metallurgical 7/	W	W	W	W	1,900	9,680	5,350	25,500
Special 8/	--	--	3	16	--	--	1,160	14,500
Other miscellaneous uses and specified uses not listed	--	--	--	--	--	--	4	32
Unspecified: 9/								
Reported	1,190	6,210	3,170	16,600	3,660	19,600	22,700	112,000
Estimated	1,900	8,400	1,900	8,500	4,500	20,000	8,100	39,000
Total	5,020	24,400	8,860	44,100	21,600	116,000	62,400	336,000

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes filter stone, macadam, riprap and jetty stone, and other coarse aggregate.

3/ Includes bituminous aggregate (coarse), bituminous surface treatment aggregate, concrete aggregate (coarse), railroad ballast, and other graded coarse aggregate.

4/ Includes screening (undesignated), stone sand (bituminous mix or seal), stone sand (concrete), and other fine aggregate.

5/ Includes crusher run (select material or fill), graded road base or subbase, light weight aggregate (slate), roofing granules, terrazzo and exposed aggregate, unpaved road surfacing, and other coarse and fine aggregate.

6/ Includes agricultural limestone and poultry grit and mineral food.

7/ Includes cement manufacture, flux stone, lime manufacture, and sulfur oxide removal.

8/ Includes asphalt fillers or extenders, mine dusting or acid water treatment, whiting or whiting substitute, and other fillers or extenders.

9/ Reported and estimated production without a breakdown by end use.

TABLE 5
PENNSYLVANIA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	2,200	$15,800	$7.21
Plaster and gunite sands	27	199	7.37
Concrete products (blocks, bricks, decorative, pipe, etc.)	24	121	5.04
Asphaltic concrete aggregate and other bituminous mixtures	1,170	6,580	5.61
Road base and coverings 2/	1,550	8,350	5.38
Fill	2,560	12,400	4.86
Snow and ice control	162	842	5.20
Filtration	15	130	8.67
Other miscellaneous uses 3/	843	3,580	4.24
Unspecified: 4/			
Reported	5,660	40,600	7.18
Estimated	3,700	21,000	5.70
Total or average	17,900	110,000	6.13

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes road and other stabilizations (cement).

3/ Includes railroad ballast.

4/ Reported and estimated production without a breakdown by end use.

TABLE 6
PENNSYLVANIA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3		District 4		Unspecified districts	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate (including concrete sand)	416	2,130	W	W	W	W	933	8,420	--	--
Concrete products (blocks, bricks, decorative, pipe, etc.) 2/	22	103	W	W	W	W	3	18	--	--
Asphaltic concrete aggregate and other bituminous mixtures	405	2,280	361	2,420	W	W	W	W	--	--
Road base and coverings 3/	823	4,360	341	1,840	239	1,100	148	1,050	--	--
Fill	172	572	49	137	301	1,330	2,030	10,400	--	--
Snow and ice control	40	185	28	229	83	354	11	75	--	--
Other miscellaneous uses 4/	226	1,300	825	5,250	503	2,030	587	2,510	--	--
Unspecified: 5/										
Reported	1,690	14,500	722	4,440	2,360	18,400	745	3,010	147	244
Estimated	1,400	6,500	400	2,500	1,800	11,000	87	610	--	--
Total	5,150	31,900	2,730	16,800	5,310	34,600	4,550	26,100	147	244

W Withheld to avoid disclosing company proprietary data; included with "Other miscellaneous uses." -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

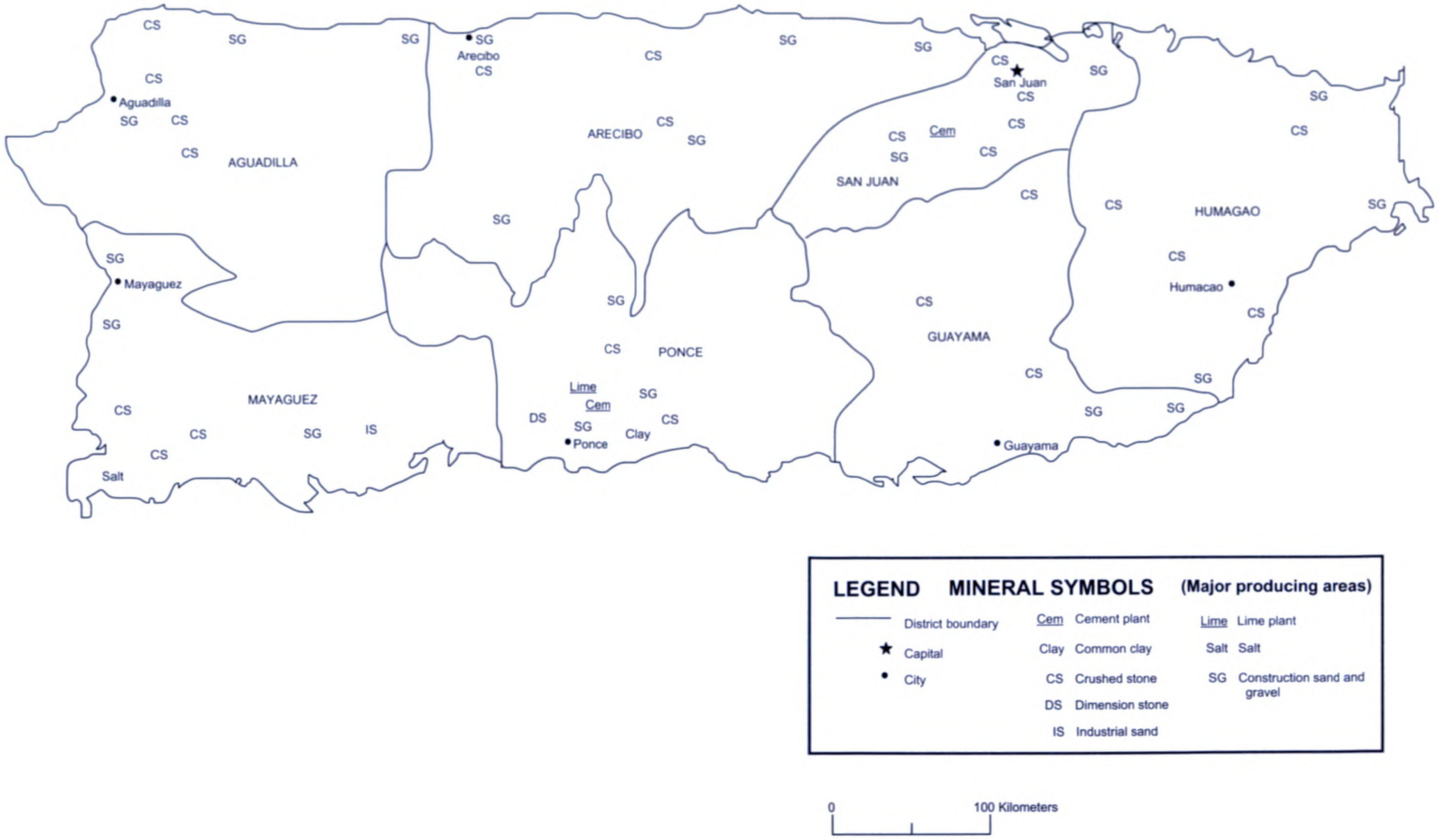
2/ Includes plaster and gunite sands.

3/ Includes road and other stabilizations (cement).

4/ Includes filtration and railroad ballast.

5/ Reported and estimated production without a breakdown by end use.

PUERTO RICO



Source: Department of Natural Resources, Commonwealth of Puerto Rico/U.S. Geological Survey (2001)

THE MINERAL INDUSTRY OF PUERTO RICO AND THE ADMINISTERED ISLANDS

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Puerto Rico Department of Natural Resources, Bureau of Geology, for collecting information on all nonfuel minerals.

In 2001, the estimated value[1] of nonfuel raw mineral production for Puerto Rico[2] was $186 million, based upon preliminary U.S. Geological Survey (USGS) data. If ranked in comparison with the 50 States, Puerto Rico would rank 40th in total nonfuel mineral production value. Portland cement, by value, continued to be the Commonwealth's leading nonfuel mineral commodity, followed by crushed stone. Construction sand and gravel was produced in Puerto Rico, but production data are not available. The collection and compilation of production data for construction sand and gravel were discontinued in 1973 by the U.S. Bureau of Mines (the Federal Government agency then responsible for collecting domestic raw nonfuel mineral production data) because of a low rate of response to surveys by the industry (Sikich and Alonso, 1993). The data for dimension stone, as well as for industrial sand and gravel, were withheld to protect company proprietary data.

Metals have not been mined in Puerto Rico since the Juncos iron mine closed in 1953; prospects for resuming metal mining in the near future do not appear to be likely. However, metal occurrences are common on the island, and the possibility of developing a metal deposit should not be completely discounted (Sikich and Alonso, 1993).

Of the U.S. Administered Islands, only American Samoa and Guam have reported nonfuel mineral production data, and these have been limited to crushed stone. American Samoa's data have been withheld to protect company proprietary data (table 1).

Reference Cited

Sikich, S.W., and Alonso, R.M., 1993, The mineral industries of Puerto Rico, Northern Marianas, Island Possessions, and Trust Territory: U.S. Bureau of Mines Minerals Yearbook 1992, v. II, p. 467-470.

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[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2001 USGS mineral production data published in this chapter are preliminary estimates as of August 2002 and are expected to change. For some mineral commodities, such as construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Specialist contact information may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals/contacts/comdir.html; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2] While a Memorandum of Understanding (MOU) was officially made between the U.S. Geological Survey (USGS) and the Commonwealth of Puerto Rico, MOUs were not established with the Commonwealth of the Northern Mariana Islands, U.S. Caribbean and Pacific Island Possessions, or the U.S. Trust Territory of the Pacific Islands. Nevertheless, data on nonfuel mineral production were reported to the USGS for the island of Guam of the Pacific Island Possessions. These data appear in table 1.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN THE COMMONWEALTH OF PUERTO RICO AND ISLANDS ADMINISTERED BY THE UNITED STATES 1/ 2/

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral	1999		2000		2001 p/	
	Quantity	Value	Quantity	Value	Quantity	Value
Puerto Rico:						
Cement, portland metric tons	W	W	1,660 e/	W	1,540 e/	W
Clays, common	159	W	141	458	144	458
Lime	27	3,770	16	2,750	15	1,000
Salt	45	1,500	45	1,500	45	1,500
Stone, crushed	13,200	56,800	10,800	51,000	10,800	51,000
Combined values of sand and gravel (industrial), stone (dimension marble), and values indicated by symbol W	XX	178,000	XX	143,000 r/	XX	132,000
Total	XX	240,000	XX	199,000 r/	XX	186,000
Administered Islands:						
American Samoa, stone, crushed	W	(3/)	--	--	--	--
Guam, stone, crushed	1,740	11,800	121	856	121	856
Virgin Islands, stone, crushed limestone and traprock	W	(3/)	W	(3/)	W	(3/)
Total	XX	11,800	XX	856	XX	856

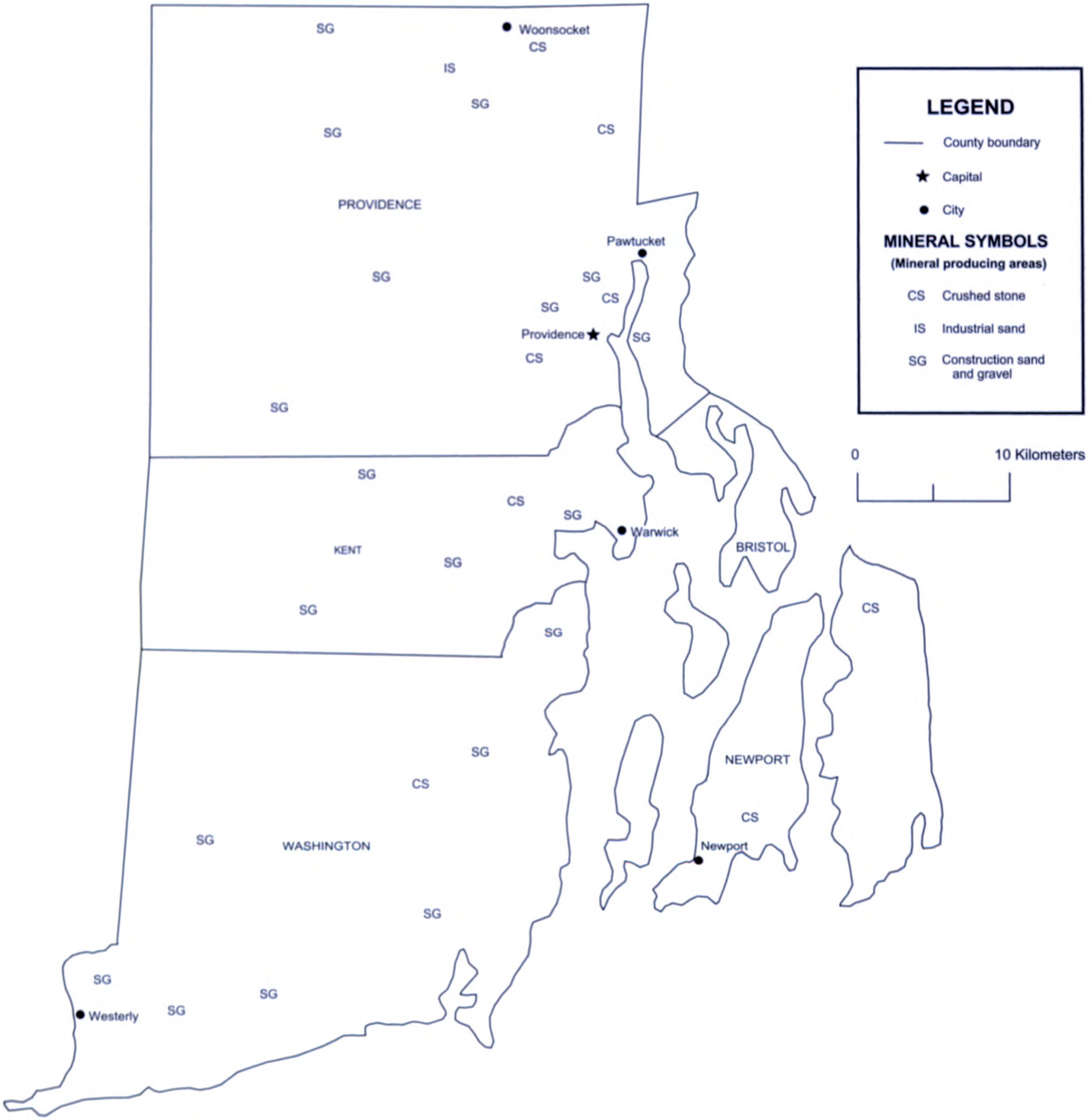
e/ Estimated. p/ Preliminary. W Withheld to avoid disclosing company proprietary data; value included with "Combined values" data. XX Not applicable. -- Zero.

1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/ Data are rounded to three significant digits; may not add to totals shown.

3/ Withheld to avoid disclosing company proprietary data.

RHODE ISLAND



Source: Rhode Island Geological Survey/U.S. Geological Survey (2001)

THE MINERAL INDUSTRY OF RHODE ISLAND

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Rhode Island Geological Survey for collecting information on all nonfuel minerals.

In 2001, the estimated value[1] of nonfuel mineral production for Rhode Island was $28.3 million, based upon preliminary U.S. Geological Survey data. This was a significant increase from that of 2000[2] and followed an 8.1% decrease in value from 1999 to 2000. Because data for industrial sand and gravel has been withheld to protect company proprietary data, the actual total values for 1999-2001 are higher than (while following the same trend as) those reported in table 1. Most of the State's nonfuel mineral production resulted from the mining and production of two basic construction materials—crushed stone and construction sand and gravel. These two accounted for about 68% and 31%, respectively, of Rhode Island's nonfuel mineral economy as reported in table 1. Additionally, gemstones were mined in the State by hobbyists. In 2001, Rhode Island's increase in value resulted from the rise in the production and value of crushed stone. Construction sand and gravel production and value were down slightly, and production and value of gemstones were unchanged. In 2000, the production and value of crushed stone was down $1.6 million, accounting for most of the drop in value for the year (table 1). Industrial sand and gravel was also down slightly.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN RHODE ISLAND 1/ 2/

(Thousand metric tons and thousand dollars)

Mineral	1999 Quantity	1999 Value	2000 Quantity	2000 Value	2001 p/ Quantity	2001 p/ Value
Gemstones	NA	1	NA	1	NA	1
Sand and gravel:						
Construction	1,310	9,900	1,240	9,780	1,120	9,000
Industrial	W	(3/)	104	(3/)	104	(3/)
Stone, crushed	2,070	12,200	1,860	10,600	3,300	19,300
Total	XX	22,100	XX	20,300	XX	28,300

p/ Preliminary. NA Not available. W Withheld to avoid disclosing company proprietary data. XX Not applicable.

1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/ Data are rounded to no more than three significant digits; may not add to totals shown.

3/ Value excluded to avoid disclosing company proprietary data.

TABLE 2
RHODE ISLAND: CRUSHED STONE SOLD OR USED, BY KIND 1/

Kind	1999 Number of quarries	1999 Quantity (thousand metric tons)	1999 Value (thousands)	1999 Unit value	2000 Number of quarries	2000 Quantity (thousand metric tons)	2000 Value (thousands)	2000 Unit value
Limestone	1	W	W	W	1	W	W	W
Granite	6	W	W	W	6	W	W	W
Traprock	2	W	W	W	2	W	W	W
Total or average	XX	2,070	$12,200	$5.90	XX	1,860	$10,600	$5.69

W Withheld to avoid disclosing company proprietary data; included in "Total." XX Not applicable.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

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[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2001 USGS mineral production data published in this chapter are preliminary estimates as of August 2002 and are expected to change. For some mineral commodities, such as construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Specialist contact information may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals/contacts/comdir.html; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2] Values, percentage calculations, and rankings for 2000 may differ from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also change.

TABLE 3
RHODE ISLAND: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate, graded:			
Concrete aggregate, coarse	W	W	$4.17
Bituminous aggregate, coarse	W	W	4.17
Fine aggregate (-3/8 inch):			
Stone sand, concrete	W	W	3.61
Stone sand, bituminous mix or seal	W	W	3.61
Coarse and fine aggregates, crusher run (select material or fill)	(3/)	(3/)	W
Agricultural, agricultural limestone	W	W	5.80
Other miscellaneous uses and specified uses not listed	W	W	5.00
Unspecified, estimated 4/	1,800	$10,000	5.76
Total or average	1,860	10,600	5.69

W Withheld to avoid disclosing company proprietary data; included in "Total."

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes granite, limestone, and traprock.

3/ Less than ½ unit.

4/ Estimated production without a breakdown by end use.

TABLE 4
RHODE ISLAND: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand) 2/	508	$4,430	$8.71
Asphaltic concrete aggregates and road base materials	W	W	9.18
Fill	114	776	6.81
Snow and ice control	W	W	10.85
Other miscellaneous uses 3/	222	2,080	9.39
Unspecified: 4/			
Reported	37	196	5.30
Estimated	360	2,300	6.48
Total or average	1,240	9,780	7.92

W Withheld to avoid disclosing company proprietary data; included with "Other miscellaneous uses."

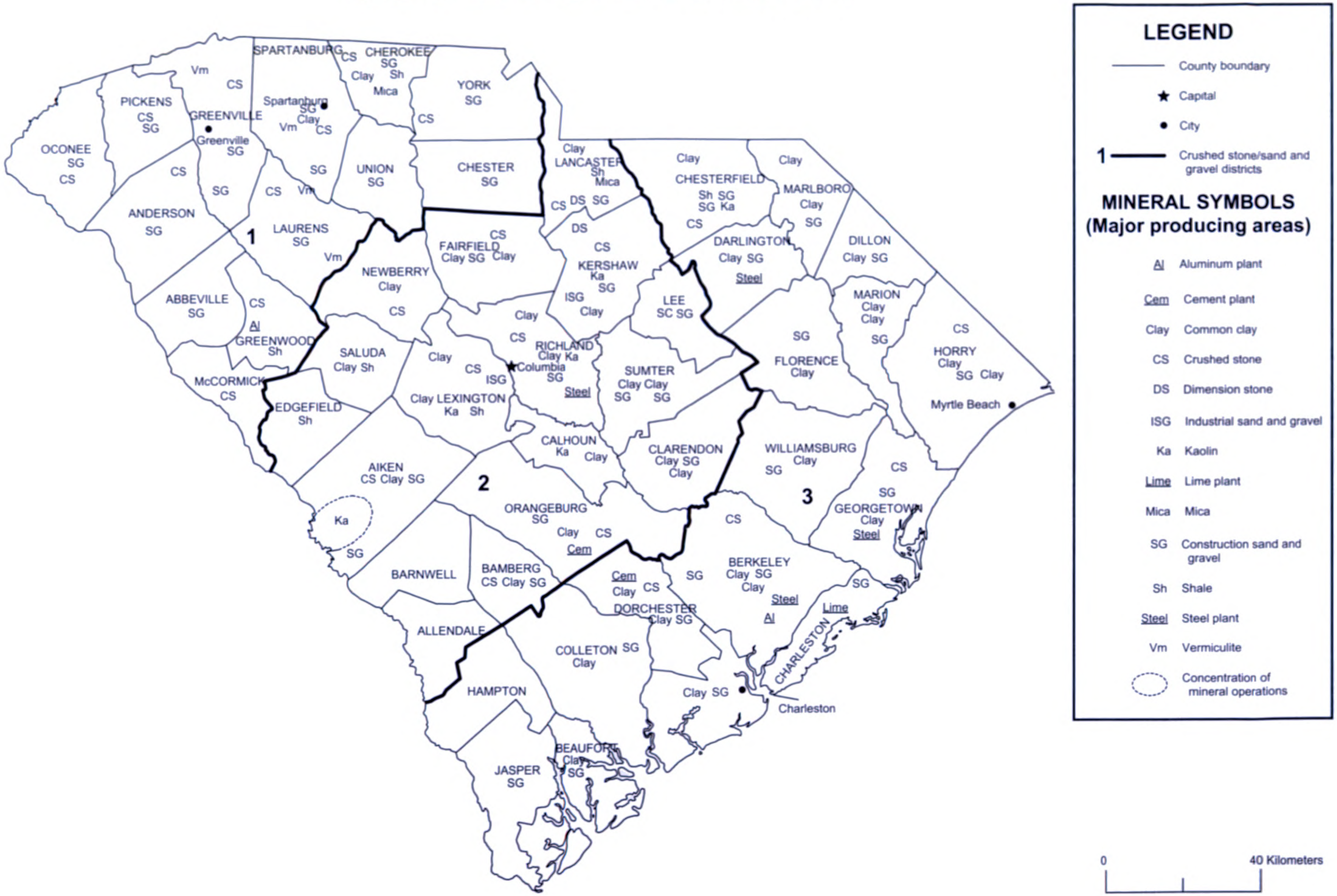
1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Includes plaster and gunite sands.

3/ Includes railroad ballast and snow and ice control.

4/ Reported and estimated production without a breakdown by end use.

SOUTH CAROLINA



Source: South Carolina Geological Survey/U.S. Geological Survey (2001)

THE MINERAL INDUSTRY OF SOUTH CAROLINA

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the South Carolina Geological Survey for collecting information on all nonfuel minerals.

In 2001, the estimated value[1] of nonfuel mineral production for South Carolina was $531 million, based upon preliminary U.S. Geological Survey (USGS) data. This was about a 4% decrease from that of 2000[2] and followed a 3.2% decrease from 1999 to 2000. The State remained 27th in rank among the 50 States in total nonfuel mineral production value, of which South Carolina accounted for about 1% of the U.S. total.

In 2001, cement (portland and masonry) by value was the State's leading nonfuel mineral commodity followed by crushed stone, construction sand and gravel, kaolin, industrial sand and gravel, and vermiculite. The first three accounted for almost 90% of South Carolina's total nonfuel mineral production value. Gold had been a significant portion of the State's nonfuel mineral economy for more than a decade, but gold has not been produced in South Carolina since Kennecott Minerals Co.'s Ridgeway Mine ceased production in the fall of 1999.

In 2000, increases in the values of lime, kaolin, portland cement, and construction sand and gravel, were more than offset by the substantial decrease in the value of gold, plus smaller yet significant decreases in the values of masonry cement and common clay, resulting in the net decrease of the year (descending order of change) (table 1). All other changes in value were less than $1 million and had little effect on the overall result.

Based upon USGS estimates of the quantities produced in the 50 States in 2001, South Carolina remained first of 2 States that produce vermiculite, third in kaolin and fire clays (descending order of value), and was fourth in masonry cement. While the State decreased to 4th from 3d in mica and to 11th from 8th in portland cement, it continued to be 11th in industrial sand and gravel. Additionally, significant quantities of crushed stone, construction sand and gravel, dimension stone, and common clay were produced in South Carolina. Primary aluminum and raw steel also were produced in the State but from raw materials that were acquired from other domestic and foreign sources. South Carolina rose to seventh from eighth of 13 States in the production of primary aluminum in 2001.

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[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2001 USGS mineral production data published in this chapter are preliminary estimates as of August 2002 and are expected to change. For some mineral commodities, such as construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Specialist contact information may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals/contacts/comdir.html; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2] Values, percentage calculations, and rankings for 2000 may differ from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also change.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN SOUTH CAROLINA 1/ 2/

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral	1999		2000		2001 p/	
	Quantity	Value	Quantity	Value	Quantity	Value
Cement:						
Masonry	421	49,400 e/	411	45,500 e/	390 e/	43,700 e/
Portland	2,610	205,000 e/	2,910	210,000 e/	2,920 e/	211,000 e/
Clays:						
Common	1,130	4,930	890	2,790	890	2,790
Fire	35	45	40	50	W	W
Kaolin	408	15,700	397	21,900	422	20,600
Gemstones	NA	1	NA	1	NA	1
Sand and gravel:						
Construction	9,660	38,200	10,300	40,800	10,100	40,500
Industrial	769	18,400	755	18,600	755	18,600
Stone:						
Crushed	28,600 r/	189,000 r/	29,400	189,000	27,200	180,000
Dimension metric tons	9,230	855	W	W	W	W
Combined values of gold (1999), lime (1999-2000), mica (crude), silver (1999), vermiculite, and values indicated by symbol W	XX	47,800 r/	XX	21,900	XX	13,500
Total	XX	569,000 r/	XX	551,000	XX	531,000

e/ Estimated. p/ Preliminary. r/ Revised. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined values" data. XX Not applicable.

1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/ Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 2
SOUTH CAROLINA: CRUSHED STONE SOLD OR USED, BY KIND 1/

Kind	1999				2000			
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone	7 r/	3,930	$21,500	$5.48	6	4,330	$24,600	$5.67
Granite	26 r/	21,600 r/	150,000 r/	6.96 r/	24	22,000	147,000	6.67
Marble	1	W	W	W	1	W	W	W
Calcareous marl	2	W	W	W	2	W	W	W
Total or average	XX	28,600 r/	189,000 r/	6.62 r/	XX	29,400	189,000	6.42

r/ Revised. W Withheld to avoid disclosing company proprietary data; included in "Total." XX Not applicable.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 3
SOUTH CAROLINA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+1 1/2 inch):			
Macadam	W	W	$5.87
Riprap and jetty stone	W	W	12.90
Filter stone	W	W	9.97
Other coarse aggregate	4,540	$29,000	6.68
Coarse aggregate, graded:			
Concrete aggregate, coarse	W	W	8.80
Bituminous aggregate, coarse	W	W	9.67
Railroad ballast	W	W	9.63
Other graded coarse aggregate	7,400	57,900	7.82
Fine aggregate (-3/8 inch):			
Stone sand, bituminous mix or seal	W	W	5.86
Screening, undesignated	W	W	5.08
Other fine aggregate	2,450	12,800	5.20
Coarse and fine aggregates:			
Graded road base or subbase	W	W	9.83
Crusher run or fill or waste	W	W	5.90
Other coarse and fine aggregates	2,260	14,300	6.34
Chemical and metallurgical, cement manufacture	(3/)	(3/)	4.71
Unspecified: 4/			
Reported	8,890	56,100	6.31
Estimated	250	1,600	6.39
Total or average	29,400	189,000	6.42

W Withheld to avoid disclosing company proprietary data; included with "Other."

1/ Data are rounded to three significant digits, except unit value; may not add to totals shown.

2/ Includes calcareous marl, granite, limestone, and marble.

3/ Withheld to avoid disclosing company proprietary data; included in "Total."

4/ Reported and estimated production without a breakdown by end use.

TABLE 4
SOUTH CAROLINA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1 1/2 inch) 2/	2,800	18,600	W	W	W	W
Coarse aggregate, graded 3/	4,530	31,500	W	W	W	W
Fine aggregate (-3/8 inch) 4/	1,560	7,020	W	W	W	W
Coarse and fine aggregate 5/	1,400	5,940	--	--	857	8,380
Chemical and metallurgical 6/	--	--	W	W	W	W
Unspecified: 7/						
Reported	1,630	10,100	4,030	25,500	3,240	20,500
Estimated	--	--	180	1,200	64	410
Total	11,900	73,200	9,080	59,900	8,430	55,700

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes filter stone, macadam, riprap and jetty stone, and other coarse aggregate.

3/ Includes bituminous aggregate (coarse), concrete aggregate (coarse), railroad ballast, and other graded coarse aggregate.

4/ Includes screening (undesignated), stone sand (bituminous mix or seal), and other fine aggregate.

5/ Includes crusher run (select material or fill), graded road base or subbase, and other coarse and fine aggregates.

6/ Includes cement manufacture.

7/ Reported and estimated production without a breakdown by end use.

TABLE 5
SOUTH CAROLINA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	3,430	$13,200	$3.85
Concrete products (blocks, bricks, pipe, decorative, etc.)	381	1,410	3.70
Asphaltic concrete aggregates and other bituminous mixtures	168	392	2.33
Road base and coverings 2/	113	613	5.42
Fill	2,080	6,060	2.91
Snow and ice control	5	32	6.40
Other miscellaneous uses 3/	146	676	4.63
Unspecified: 4/			
Reported	3,460	16,500	4.75
Estimated	550	2,000	3.58
Total or average	10,300	40,800	3.95

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes road and other stabilization (cement).

3/ Includes filtration and railroad ballast.

4/ Reported and estimated production without a breakdown by end use.

TABLE 6
SOUTH CAROLINA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products	410	1,390	1,340	4,370	2,060	8,840
Asphaltic concrete aggregates and road base materials 2/	W	W	W	W	W	W
Fill	59	175	104	227	1,920	5,660
Other miscellaneous uses 3/	13	55	55	175	363	1,480
Unspecified: 4/						
Reported	6	22	691	3,670	2,770	12,800
Estimated	220	880	15	58	320	1,100
Total	711	2,520	2,200	8,500	7,420	29,800

W Withheld to avoid disclosing company proprietary data; included with "Other miscellaneous uses."

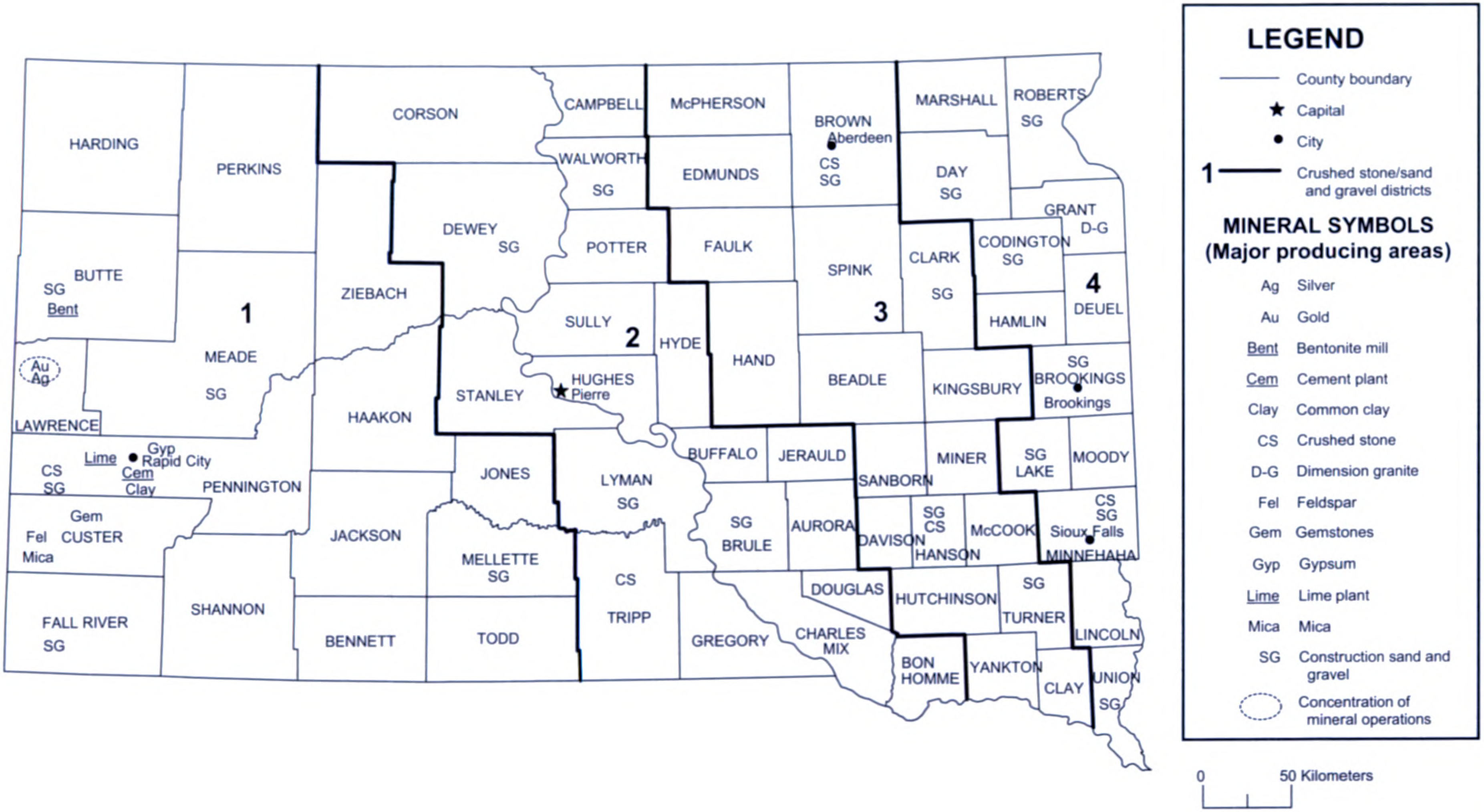
1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes road and other stabilization (cement).

3/ Includes filtration, railroad ballast, and snow and ice control.

4/ Reported and estimated production without a breakdown by end use.

SOUTH DAKOTA



Source: South Dakota Geological Survey/U.S. Geological Survey (2001)

THE MINERAL INDUSTRY OF SOUTH DAKOTA

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the South Dakota Geological Survey for collecting information on all nonfuel minerals.

In 2001, the estimated value[1] of nonfuel raw mineral production for South Dakota was $255 million, based upon preliminary U.S. Geological Survey (USGS) data. This was about a 9% increase from that of 2000[2] and followed a 15.8% decrease from 1999 to 2000.

In 2001, gold remained South Dakota's leading nonfuel mineral by value. The State's production of metals, which also include iron ore and silver, accounted for more than one-third of the State's total nonfuel mineral production value. Cement, including both portland and masonry, was the second-leading nonfuel mineral commodity, followed by construction sand and gravel, crushed stone, and granite dimension stone. Increases in the values of gold, portland cement, and granite dimension stone (descending order of change in value) accounted for most of the State's rise in value. In 2000, a significant decrease in the value of gold plus significantly smaller decreases in lime, granite dimension stone, and portland cement led to the State's drop in value for the year. All increases were on the order of less than $1 million, having little effect on the overall result (table 1).

Based upon USGS estimates of the quantities produced in the 50 States during 2001, South Dakota remained the second leading State in the production of granite dimension stone and seventh in feldspar. While the State increased to fifth from sixth in gold, it decreased to fifth from fourth in mica. Additionally, South Dakota was a significant producer of construction sand and gravel.

The following narrative information was provided by the South Dakota Department of Environment and Natural Resources' (DENR) Minerals and Mining Program[3] (MMP) in association with DENR's South Dakota Geological Survey. Production data in the text that follows are those reported by the MMP based upon the agency's own surveys and estimates. Data may differ from some production figures reported to the USGS.

Despite low gold prices, gold production and value increased in 2001 in South Dakota for the first time in 5 years. Homestake Mining Co. and Wharf Resources (USA), Inc. produced 9,000 kilograms (kg) of gold in 2001. This represented an 8.4% increase in the amount of gold produced compared with 2000. Gold remained the leading mineral commodity in South Dakota in terms of value. The average price of gold in 2001 was $271.02 per troy ounce, yielding a gross value of $78.4 million. This was 5.6% higher than the 2000 gross value of $73.9 million. The mines are surface heap-leach operations, with the exception of Homestake's operations, which are underground (Holm and others, 2002).

Homestake and Wharf also produced silver as a byproduct in the gold recovery process. A total of 4,870 kg of silver was recovered in 2001. At an average price of $4.37 per troy ounce, the value of silver was $684,000, an increase from the 2,480 kg and $395,000 value reported in 2000.

Homestake, which has been a part of South Dakota history for 125 years, mined its last ton of gold ore on December 14, 2001. The mine, which was once the largest gold mine in the Western Hemisphere, began closure activities that will include dismantling buildings and reclaiming areas associated with its 125-year mining history. In anticipation of the closure, Homestake completed several reclamation activities prior to and during 2001.

In addition to the mine closure, Homestake announced a merger with Barrick Gold Corp., making the new company the third largest gold mining company in the world. The merger was completed on December 14, 2001, the same day the last ton of gold ore was mined at the Homestake Mine. Homestake was also delisted on the New York Stock Exchange on that date. It was originally listed on the exchange on January 25, 1879. The parent company will operate under the Barrick Gold name. Barrick Gold also owns the Richmond Hill Mine [owned by LAC Minerals (USA), LLC until the acquisition of LAC Minerals by Barrick Gold in 1994] in South Dakota, which has been in reclamation for the past 8 years.

Gold exploration activities in South Dakota were limited due to continued low gold prices and other factors. Wharf completed 57 exploration drill holes in the vicinity of its existing operation in Lawrence County. These holes tested an extension of Wharf's Trojan deposit, which occurs in Deadwood Formation sedimentary units, and associated intrusions of monzonite porphyry.

Wharf announced that it would close the Golden Reward Mine and begin final reclamation in 2002. The mine is owned by Wharf and has been in temporary cessation for the past 5 years. Final reclamation will consist of backfilling pits in the western part of the mine, reconstructing the upper Fantail Creek drainage, and completing topsoil placement and revegetation. Most of the backfilling and regrading work will be completed by October 2002. About 1.9 million cubic meters will be moved during reclamation.

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[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2001 USGS mineral production data published in this chapter are preliminary estimates as of August 2002 and are expected to change. For some mineral commodities, such as construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Specialist contact information may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals/contacts/comdir.html; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2] Values, percentage calculations, and rankings for 2000 may differ from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also change.

[3] E.H Holm, D.K. Burtts, M.R. Nelson, and Erik Nelson of the South Dakota Department of Environmental Natural Resources' Minerals and Mining Program jointly authored the text of the State mineral industry information provided by that agency.

There are currently 11 mine permits that cover 7 large-scale gold mining operations in South Dakota. No new mine permits or mine permit amendments were issued to large-scale gold operations in 2001. One permit was closed in 2001. The Board of Minerals and Environment released Dakota Placer's reclamation bond for its Red Placer Mine near Deadwood.

During 2001, 493 companies had active mine licenses in South Dakota. An operator must obtain a license to mine for pegmatite minerals, materials used in the process of making cement or lime, rock to be crushed and used in construction, and sand and gravel. There were also 35 mine permits that covered the mining of other minerals, such as bentonite, dimension stone, placer gold, and slate.

Sand and gravel was the major nonmetallic mineral commodity produced, with 15.4 million metric tons (Mt) reported. Sand and gravel was produced in nearly every county in South Dakota and was used mainly for road construction projects.

The second largest nonmetallic mineral commodity produced in 2001 was limestone with 3.95 Mt reported. GCC Dacotah (formed by the acquisition of Dacotah Cement by Grupo Cementos de Chihuahua in March 2001) alone produced 1.34 Mt of limestone for cement. It also produced 220,000 metric tons (t) of shale, 44,000 t of gypsum, and 46,000 t of sand.

Sioux quartzite was the third largest nonmetallic mineral commodity produced, with 3.06 Mt reported. It is quarried from four locations in southeastern South Dakota. Most of the quartzite is crushed and used in construction. Some larger blocks are used for rip-rap, railroad ballast, and occasionally for decorative purposes.

A total of 350,000 t of granite was mined by Dakota Granite Co. and Cold Spring Granite Co. from quarries near Milbank, South Dakota. Because of its beauty and distinctive red color, the mahogany granite is used primarily for floor tiles, monuments, and building construction. Much of it goes to international markets.

Other minerals produced in lesser amounts in 2001 included bentonite, iron ore, mica schist, pegmatite minerals (feldspar, mica, rose quartz), placer gold, and slate.

Mine Reclamation

Reclamation activities at the Gilt Edge Mine, which began in the fall of 2000, continued throughout 2001. The U.S. Environmental Protection Agency (EPA) took over management of the mine from the State on July 31, 2000, and the mine was placed on the Superfund National Priority List on December 1, 2000. Through an interagency agreement, the EPA retained the U.S. Department of the Interior's U.S. Bureau of Reclamation to manage the site and develop closure plans. Reclamation efforts have concentrated on getting the Ruby Gulch waste rock dump, the major source of acid mine drainage at the site, ready for capping. About 1.07 million cubic meters of material was moved on the dump in order to reduce slopes to a 3.5:1 slope. The Bureau also constructed ditches to divert water around the dump. At the end of 2001, earthmoving activities were nearing completion, with all earthmoving scheduled to be completed by February 2002. Plans were to place a geomembrane (plastic) liner and rock drainage layer over the regraded waste dump in summer 2002.

Water-treatment continued at the mine site in 2001. More than 890 million liters (Ml) of acid water has been treated and discharged since the State took over the mine in July 1999. Acid water stored in the pits had been reduced to 341 Ml by yearend 2001 from 568 Ml in July 1999.

The Richmond Hill Mine continues to show improvement since major reclamation activities were completed in the mid-1990s. The performance of the pit impoundment, backfilled with acid-generating rock and covered with a low-permeability capping system, continued to surpass expectations again in 2001. Monitoring data showed that only minimum amounts of oxygen and water were being detected in the impoundment, indicating the cap was effective in limiting oxygen and water infiltration and is preventing acid generation.

The capped leach pads also continued to perform well. Monitoring data showed the capping systems were effective in reducing water infiltration into the spent ore. Water draining from the leach pads was being treated in an innovative passive wetland-treatment system constructed in 2000. Passive treatment systems allow naturally occurring biological processes to treat mine drainage in a controlled environment. Results from 2001 show that the passive treatment system was effective in reducing nitrates, sulfates, and selenium. LAC planned to adjust the system in 2002 to improve removal rates.

Ground and surface water quality around the mine site is closely monitored. Ground water impacted by acid rock drainage prior to mine reclamation is steadily improving. Monitoring wells generally show decreasing trends in sulfate and metal concentrations and increasing pH. Biological assessments of Squaw Creek below the mine show that the stream remains healthy and supports a viable cold water fishery.

The DENR worked with the U.S. Forest Service and the EPA to reclaim the historic Minnesota Ridge Mine, which is south of Lead in Lawrence County, in summer 2001. In fall 2000, buildings at the site were demolished in preparation for reclamation activities. Reclamation activities in 2001 included removing acid-generating rock from a drainage, placing the rock in a capped facility on a nearby ridge, and reconstructing the drainage. The U.S. Forest Service plans to conduct other activities at the site in 2002 to complete reclamation.

The State is also involved in a partnership with the Western Governors Association and the U.S. Forest Service to obtain additional funding to reclaim the King of the West and the Yellow Bird Mines, which are southwest of Rochford in Pennington County, through the Abandoned Mined Land Initiative. The initiative is a partnership created in 1997 between the Western Governors Association and the National Mining Association to address obstacles to abandoned mine reclamation. Hazards at the sites include acid-generating tailings, open shafts, collapsed buildings, and other structures. The Forest Service was developing a plan to reclaim the site with reclamation scheduled to start in 2002 or 2003.

Reference Cited

Holm, E.H., Cline, T., Jr., and Nelson, M.R., 2002, South Dakota, *in* Annual review 2001: Mining Engineering, v. 54, no. 5, May, p. 78-80.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN SOUTH DAKOTA 1/ 2/

(Thousand metric tons and thousand dollars unless otherwise specified)

	1999		2000 r/		2001 p/	
Mineral	Quantity	Value	Quantity	Value	Quantity	Value
Clay, common	183	W	191	W	191	W
Gemstones	NA	5	NA	W	NA	W
Gold 3/ kilograms	10,300	113,000	8,230	74,200	W	W
Sand and gravel, construction	12,400	45,600	12,800	46,500	11,500	42,500
Silver 3/ metric tons	W	W	1	227	W	W
Stone, crushed	6,020	26,500	5,460	25,500	5,400	26,000
Combined values of cement, feldspar, gypsum (crude), iron ore (usable), lime, mica (crude), stone (dimension granite), and values indicated by symbol W	XX	93,100	XX	87,400	XX	187,000
Total	XX	278,000	XX	234,000	XX	255,000

p/ Preliminary. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined values" data. XX Not applicable.

1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/ Data are rounded to no more than three significant digits; may not add to totals shown.

3/ Recoverable content of ores, etc.

TABLE 2
SOUTH DAKOTA: CRUSHED STONE SOLD OR USED, BY KIND 1/

	1999				2000			
Kind	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone	4	W	W	W	4	W	W	W
Granite	2	W	W	W	2	W	W	W
Quartzite	5	W	W	W	9	W	W	W
Total or average	XX	6,020	$26,500	$4.40	XX	5,460	$25,500	$4.67

W Withheld to avoid disclosing company proprietary data; included in "Total." XX Not applicable.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 3
SOUTH DAKOTA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+1 1/2 inch):			
Riprap and jetty stone	W	W	$5.20
Filter stone	W	W	6.32
Other coarse aggregate	200	$1,180	5.92
Coarse aggregate, graded:			
Concrete aggregate, coarse	W	W	6.27
Bituminous aggregate, coarse	W	W	6.45
Bituminous surface-treatment aggregate	W	W	6.49
Railroad ballast	W	W	6.56
Other graded coarse aggregate	1,050	7,250	6.88
Fine aggregate (-3/8 inch):			
Stone sand, bituminous mix or seal	W	W	5.91
Other fine aggregate	372	2,340	6.28
Coarse and fine aggregates:			
Graded road base or subbase	W	W	4.89
Crusher run or fill or waste	W	W	6.11
Other coarse and fine aggregates	383	1,690	4.40
Other construction materials	(3/)	(3/)	5.95
Chemical and metallurgical:			
Cement manufacture	(3/)	(3/)	1.68
Lime manufacture	(3/)	(3/)	16.54
Other miscellaneous uses and specified uses not listed	(3/)	(3/)	6.00
Unspecified: 4/			
Reported	1,280	5,300	4.13
Estimated	850	3,500	4.13
Total or average	5,460	25,500	4.67

W Withheld to avoid disclosing company proprietary data; included with "Other."

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Includes granite, limestone, and quartzite.

3/ Withheld to avoid disclosing company proprietary data; included in "Total."

4/ Reported and estimated production without a breakdown by end use.

TABLE 4
SOUTH DAKOTA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE AND DISTRICT 1/ 2/

(Thousand metric tons and thousand dollars)

	District 1		District 3		District 4	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1 1/2 inch) 3/	W	W	--	--	W	W
Coarse aggregate, graded 4/	W	W	--	--	W	W
Fine aggregate (-3/8 inch) 5/	W	W	--	--	W	W
Coarse and fine aggregate 6/	W	W	--	--	W	W
Other construction materials	--	--	--	--	W	W
Chemical and metallurgical 7/	W	W	--	--	--	--
Other miscellaneous uses and specified uses not listed	W	W	--	--	--	--
Unspecified: 8/						
Reported	--	--	624	2,580	658	2,720
Estimated	720	3,000	--	--	130	530
Total	2,980	12,600	624	2,580	1,860	10,300

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

1/ No production reported in District 2.

2/ Data are rounded to no more than three significant digits; may not add to totals shown.

3/ Includes filter stone, riprap and jetty stone, and other coarse aggregate.

4/ Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), railroad ballast, and other graded coarse aggregate.

5/ Includes stone sand (bituminous mix or seal) and other fine aggregate.

6/ Includes crusher run (select material or fill), graded road base or subbase, and other coarse and fine aggregates.

7/ Includes cement manufacture and lime manufacture.

8/ Reported and estimated production without a breakdown by end use.

TABLE 5
SOUTH DAKOTA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	1,120	$5,940	$5.30
Plaster and gunite sands	62	488	7.87
Concrete products (blocks, bricks, pipe, decorative, etc,)	39	592	15.18
Asphaltic concrete aggregates and other bituminous mixtures	649	2,690	4.14
Road base and coverings 2/	4,130	12,800	3.09
Fill	639	1,640	2.57
Snow and ice control	52	153	2.94
Other miscellaneous uses 3/	137	548	4.00
Unspecified: 4/			
Reported	1,630	5,340	3.27
Estimated	4,300	16,000	3.81
Total or average	12,800	46,500	3.64

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Includes road and other stabilization (lime).

3/ Includes filtration, railroad ballast, and roofing granules.

4/ Reported and estimated production without a breakdown by end use.

TABLE 6
SOUTH DAKOTA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

Use	District 1		District 2	
	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products 2/	W	W	W	W
Asphaltic concrete aggregates and other bituminous mixtures	W	W	11	62
Road base materials	514	1,170	752	2,530
Fill	3	4	10	22
Other miscellaneous uses 3/	477	2,810	120	6.29
Unspecified: 4/				
Reported	591	1,530	218	414
Estimated	840	3,100	1,100	3,600
Total	2,430	8,620	2,210	7,290

	District 3		District 4	
	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products 2/	W	W	705	3,890
Asphaltic concrete aggregates and other bituminous mixtures	W	W	583	2,380
Road base materials	680	1,800	2,190	7,260
Fill	130	219	496	1,400
Other miscellaneous uses 3/	90	276	74	357
Unspecified: 4/				
Reported	110	222	712	3,170
Estimated	1,600	5,400	780	4,200
Total	2,580	7,890	5,540	22,700

W Withheld to avoid disclosing company proprietary data; included with "Other miscellaneous uses."

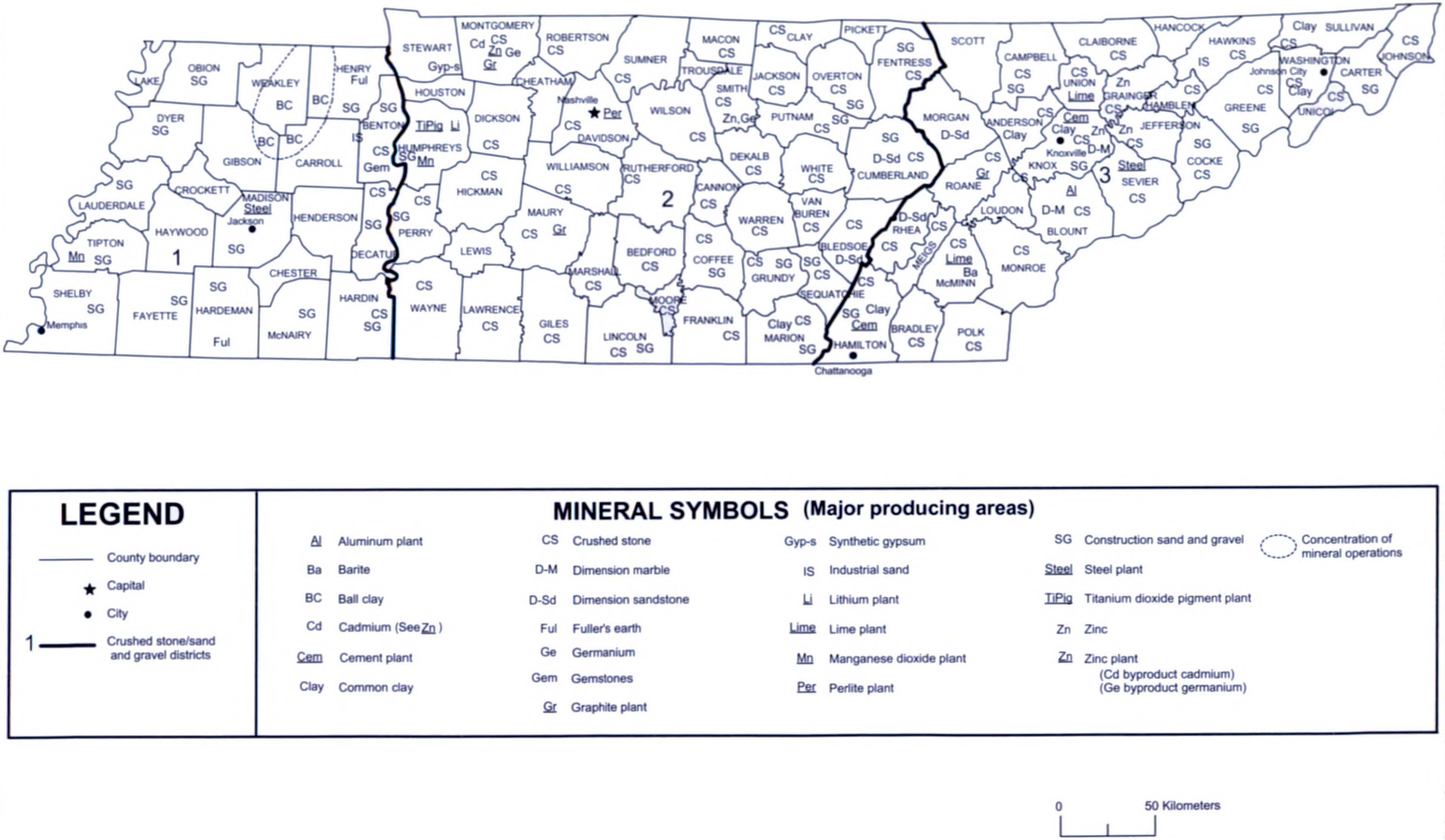
1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes plaster and gunite sands.

3/ Includes filtration, railroad ballast, roofing granules, and snow and ice control.

4/ Reported and estimated production without a breakdown by end use.

TENNESSEE



Source: Tennessee Department of Environment and Conservation, Division of Geology/U.S. Geological Survey (2001)

THE MINERAL INDUSTRY OF TENNESSEE

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Tennessee Department of Environment and Conservation, Division of Geology, for collecting information on all nonfuel minerals.

In 2001, the estimated value[1] of nonfuel raw mineral production for Tennessee was $708 million, based upon preliminary U.S. Geological Survey (USGS) data. This was about a 5% decrease from that of 2000[2] and followed a 2.6% increase from 1999 to 2000. Tennessee was 21st in rank (20th in 2000) among the 50 States in total nonfuel mineral production value, of which the State accounted for nearly 2% of the U.S. total.

Crushed stone has been Tennessee's leading mineral commodity, by value, for more than 25 years, except for 1981 when zinc was first. In 2001, crushed stone accounted for about one-half of the State's total nonfuel mineral production value. Zinc was the second leading nonfuel mineral, followed by portland cement, construction sand and gravel, and ball clay. In 2000, these rankings were the same, but zinc, with an increase of more than $35 million compared with that of 1999, had the greatest affect on the State's nonfuel mineral economy. Portland cement and industrial sand and gravel were up about $2 million each and lime was up $1million. The largest decreases in value occurred for crushed stone, down $11 million; construction sand and gravel, down $6.1 million; and fuller's earth, down slightly more than $3 million (table 1). All other changes were small relative to these.

Compared with USGS estimates of the quantities produced in the 50 States in 2001, Tennessee remained the leading gemstone and ball-clay-producing State, 2d in zinc, 3d of 3 barite-producing States, 8th in fuller's earth, 10th in industrial sand and gravel, and a significant producer of crushed stone, portland cement, and lime (descending order of value). Primary aluminum and raw steel were produced in Tennessee but were processed from materials obtained from other domestic and foreign sources. The State rose in rank to eighth from ninth in the production of primary aluminum.

The Tennessee Division of Geology provided the following narrative information.[3] By the end of 2001, a total of 326 nonfuel mineral operations had permits to mine in 82 counties across the State. Ball clay was mined in Carroll, Weakly, Henry, and Gibson Counties in northwest Tennessee by Old Hickory Clay Co., H. C. Spinks Co., Unimin Corp. (United Clays Inc.), Gleason Brick Co., and Kentucky-Tennessee Clay Co. Unimin's Carroll County mine also produced kaolinite.

General Shale Products Corp. operated eight shale mines in Washington, Sullivan, Knox, and Anderson Counties in northeast Tennessee to supply its brick production plants. Additional shale mining occurred in Hamilton and Marion Counties in southeast Tennessee. Fuller's earth was mined in Hardeman County by Moltan Co. and in Henry County by American Colloid Co.

Construction sand and gravel was produced at 91 sites located in 30 counties and operated by 63 different companies. Companies operating five or more sites included Ford Construction Co., Memphis Stone and Gravel Co., and Standard Construction Co. in District 1 (west Tennessee) and Bradley Stone and Sand Inc. in the eastern part of District 2 (middle Tennessee).

The crushed stone industry produces limestone and dolomite at 151 active quarries and underground mines located primarily in District 2 (middle Tennessee) and District 3 (east Tennessee). Crushed limestone and dolomite was produced in 66 counties by 48 different companies and 18 county highway departments. The top three producers were Vulcan Materials Co., which operated 39 quarries in 29 counties; Rogers Group Inc., which operated 31 quarries in 27 counties; and Asarco Inc. (American Limestone Co.), which operated 9 quarries in 5 counties. Crushed granite and quartzite were produced in three quarries in Johnson County.

Holston Limestone was quarried for dimension stone in Blount County by Tennessee Marble Co. and Tennessee Valley Marble Inc. Quartzitic sandstone was quarried on the Cumberland Plateau for dimension sandstone, flagstone, and ashlar. Six companies operated seven quarries in Cumberland, Bledsoe, Rhea, and Morgan Counties.

Tennessee's gem industry is located in Benton County. American Shell Co. and Tennessee Shell Co. harvested mollusk shells from the Tennessee River for seeds in the cultured pearl industry. American Pearl Co. runs the only freshwater pearl farm in the United States, which cultivates approximately 250,000 mussels each season.

In other industrial minerals, Yates Construction Co. operated two industrial-grade open pit barite mines in McMinn County. Gypsum was produced from Tennessee Valley Authority byproducts at the Allied Custom Gypsum plant in Stewart County. Industrial sand was mined in Hawkins County by Short Mountain Silica Co. and in Benton County by Unimin Corp. Bowater Southern Paper Corp. in McMinn County produced high-calcium quicklime, and Global Stone Tenn-Luttrell Inc. in Union County produced high-calcium quicklime and hydrated lime.

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[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2001 USGS mineral production data published in this chapter are preliminary estimates as of August 2002 and are expected to change. For some mineral commodities, such as construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Specialist contact information may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals/contacts/comdir.html; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2] Values, percentage calculations, and rankings for 2000 may differ from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also change.

[3] Peter Lemiszki, Chief Geologist with the Tennessee Division of Geology in Knoxville, authored the text of the State mineral industry information provided by that agency.

In the metals sectors, ASARCO Incorporated operated the Coy, Immel, and Young Mines in Jefferson and Knox Counties. Because of sluggish market conditions, zinc mining and processing operations were suspended in mid-November 2001. A total of 360 workers were laid off, but a small staff remained to continue processing agricultural lime from existing production byproducts and for care and maintenance. The Coy and Young Mines also produced a small amount of lead.

Pasminco Ltd. operated mines at Clinch Valley (mine and mill) (Grainger County) and Gordonsville (Smith County) and an electrolytic zinc plant in Clarksville (Montgomery County). The Clarksville zinc plant produced primary cadmium as a byproduct during roasting and leaching of the zinc concentrate. The mines at and near Gordonsville, the Cumberland, Elmwood, and Gordonsville Mines, are all connected underground and hoist ore through one shaft. The first two are close together and are the oldest; the newer Cumberland Mine is 11 kilometers away and mills ore from the other two mines. These mines have produced some of the highest grade zinc concentrate in the world and are among the largest sources of germanium. The mines also produced agricultural limestone, crushed stone, and masonry sand.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN TENNESSEE 1/ 2/

(Thousand metric tons and thousand dollars)

Mineral	1999		2000 r/		2001 p/	
	Quantity	Value	Quantity	Value	Quantity	Value
Clays, ball	725	30,100	685	29,300	715	30,000
Sand and gravel, construction	9,640	53,100	8,760	47,000	7,910	43,100
Stone, crushed	63,100	382,000	62,100	371,000	60,500	372,000
Combined values of barite, cement, clays (common, fuller's earth, kaolin) copper (1999), gemstones, lead (1999), lime, salt, sand and gravel (industrial), silver (1999), stone (dimension marble), zinc, and values indicated by symbol W	XX	261,000 r/	XX	298,000 r/	XX	263,000
Total	XX	726,000 r/	XX	745,000 r/	XX	708,000

p/ Preliminary. r/ Revised. XX Not applicable.

1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/ Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 2
TENNESSEE: CRUSHED STONE SOLD OR USED, BY KIND 1/

Kind	1999				2000			
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone	109 r/	56,800 r/	$347,000 r/	$6.11 r/	114	57,300	$341,000	$5.95
Dolomite	8 r/	W	W	5.58 r/	8	W	W	6.63
Granite	1	W	W	5.79	1	W	W	4.41
Sandstone	1	W	W	3.39	1	W	W	3.59
Total or average	XX	63,100	382,000	6.05	XX	62,100	371,000	5.97

r/ Revised. W Withheld to avoid disclosing proprietary data; included in "Total." XX Not applicable.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 3
TENNESSEE: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+1 1/2 inch):			
Macadam	27	$90	$3.33
Riprap and jetty stone	1,000	6,480	6.48
Filter stone	592	3,520	5.95
Other coarse aggregate	279	1,480	5.32
Total or average	1,900	11,600	6.10
Coarse aggregate, graded:			
Concrete aggregate, coarse	2,640	16,800	6.37
Bituminous aggregate, coarse	10,900	74,300	6.81
Bituminous surface-treatment aggregate	1,340	8,740	6.54
Railroad ballast	349	1,890	5.43
Other graded coarse aggregate	2,250	13,900	6.17
Total or average	17,500	116,000	6.61
Fine aggregate (-3/8 inch):			
Stone sand, concrete	1,220	8,570	7.01
Stone sand, bituminous mix or seal	270	1,610	5.95
Screening, undesignated	2,800	18,800	6.72
Other fine aggregate	999	5,040	5.05
Total or average	5,290	34,000	6.43
Coarse and fine aggregates:			
Graded road base or subbase	12,200	69,400	5.67
Unpaved road surfacing	264	913	3.46
Terrazzo and exposed aggregate	W	W	4.63
Crusher run or fill or waste	988	3,620	3.66
Roofing granules	W	W	6.00
Other coarse and fine aggregates	2,320	12,300	5.30
Total or average	15,800	86,200	5.45
Other construction materials	145	764	5.27
Agricultural, agricultural limestone	1,590	6,330	3.99
Chemical and metallurgical:			
Cement manufacture	(3/)	(3/)	3.59
Lime manufacture	524	8,660	16.53
Chemical stone for alkali works	78	309	3.96
Sulfur oxide removal	(3/)	(3/)	5.64
Special:			
Mine dusting or acid water treatment	12	94	7.83
Other fillers or extenders	162	1,600	9.90
Unspecified: 4/			
Reported	7,140	38,400	5.38
Estimated	11,000	62,000	5.83
Total or average	17,700	100,000	5.65
Grand total or average	62,100	371,000	5.97

W Withheld to avoid disclosing company proprietary data; included with "Other."

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Includes dolomite, granite, limestone, and sandstone.

3/ Withheld to avoid disclosing company proprietary data; included in "Grand total."

4/ Reported and estimated production without a breakdown by end use.

TABLE 4
TENNESSEE: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1 1/2 inch) 2/	W	W	W	W	832	5,230
Coarse aggregate, graded 3/	W	W	7,740	47,800	W	W
Fine aggregate (-3/8 inch) 4/	W	W	W	W	2,750	18,800
Coarse and fine aggregate 5/	W	W	6,770	32,500	W	W
Other construction materials	--	--	122	688	22	76
Agricultural 6/	W	W	W	W	W	W
Chemical and metallurgical 7/	--	--	W	W	W	W
Special 8/	--	--	--	--	174	1,700
Unspecified: 9/						
Reported	93	541	4,960	27,100	2,080	10,800
Estimated	--	--	6,600	38,000	4,000	23,000
Total	6,260	44,700	29,800	165,000	26,000	161,000

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes filter stone, macadam, riprap and jetty stone, and other coarse aggregate.

3/ Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), railroad ballast, and other graded coarse aggregate.

4/ Includes screening (undesignated), stone sand (bituminous mix or seal), stone sand (concrete), and other fine aggregates.

5/ Includes crusher run (select material or fill), graded road base or subbase, roofing granules, terrazzo and exposed aggregate, unpaved road surfacing, and other coarse and fine aggregates.

6/ Includes agricultural limestone.

7/ Includes cement manufacture, chemical stone for alkali works, lime manufacture, and sulfur oxide removal.

8/ Includes mine dusting or acid water treatment and other fillers or extenders.

9/ Reported and estimated production without a breakdown by end use.

TABLE 5
TENNESSEE: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand) 2/	3,750	$22,700	$6.05
Concrete products (blocks, bricks, pipe, decorative, etc.)	232	1,090	4.71
Asphaltic concrete aggregates and other bituminous mixtures	726	3,400	4.69
Road base and coverings 3/	1,470	6,830	4.65
Fill	148	1,300	8.75
Other miscellaneous uses 4/	71	826	11.63
Unspecified: 5/			
Reported	919	4,420	4.81
Estimated	1,500	6,400	4.45
Total or average	8,760	47,000	5.37

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Includes plaster and gunite sands.

3/ Includes road and other stabilization (cement and lime).

4/ Includes filtration.

5/ Reported and estimated production without a breakdown by end use.

TABLE 6
TENNESSEE: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY USE AND DISTRICT 1/ 2/

(Thousand metric tons and thousand dollars)

Use	District 1		Districts 2 and 3	
	Quantity	Value	Quantity	Value
Concrete aggregate (including concrete sand) 3/	2,240	12,100	1,510	10,600
Concrete products (blocks, bricks, pipe, decorative, etc.)	--	--	232	1,090
Asphaltic concrete aggregates and road base materials 4/	1,740	7,180	458	3,060
Other miscellaneous uses 5/	168	1,450	51	669
Unspecified: 6/				
Reported	919	4,420	--	--
Estimated	980	3,700	470	2,800
Total	6,050	28,900	2,710	18,100

-- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Districts 2 and 3 are combined to avoid disclosing company proprietary data.

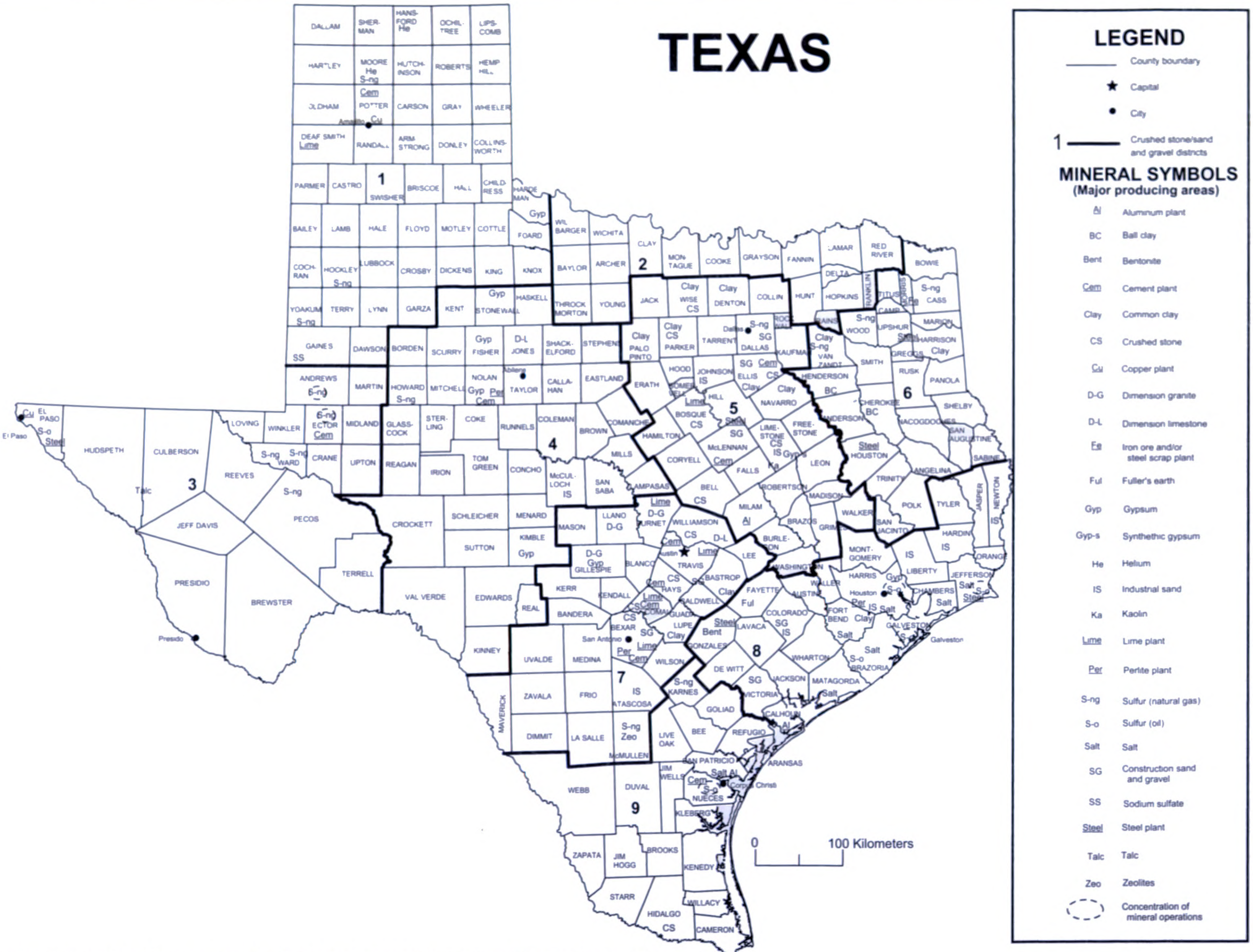
3/ Includes plaster and gunite sands.

4/ Includes road and other stabilization (cement and lime).

5/ Includes fill and filtration.

6/ Reported and estimated production without a breakdown by end use.

TEXAS



Source: University of Texas at Austin, Bureau of Economic Geology/U.S. Geological Survey (2001)

THE MINERAL INDUSTRY OF TEXAS

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the University of Texas at Austin, Bureau of Economic Geology, for collecting information on all nonfuel minerals.

In 2001, the estimated value[1] of nonfuel raw mineral production for Texas was $2.21 billion, based upon preliminary U.S. Geological Survey (USGS) data. This was about a 13% increase from that of 2000[2] and followed a 4.3% increase from 1999 to 2000. Texas rose in rank to third from fourth in the Nation in total nonfuel mineral production value, of which the State accounted for more than 5.5% of the U.S. total.

In 2001, about 94% of Texas' nonfuel mineral value came from the production of the State's top five industrial minerals, in descending order of value: cement (portland and masonry), crushed stone, construction sand and gravel, salt, and lime. The significantly increased values of the State's major construction aggregates (crushed stone and sand and gravel) and portland cement accounted for the largest increases in Texas' nonfuel mineral production value (table 1).

In 2000, crushed stone led the State's nonfuel mineral industry with an increase of $49 million, followed by construction sand and gravel, up by $35 million, portland cement, up by $24 million, industrial sand and gravel, up by about $8 million, salt, up by $6.5 million, crude helium, up by more than $5 million, and kaolin, up by more than $2 million. The largest decreases were those of sulfur (owing to the closing of the State's only producing plant), dimension stone, gypsum, lime, and Grade-A helium (descending order of change) (table 1). All other changes in value were less than $1 million.

Based upon USGS estimates of the quantities of minerals produced in the 50 States in 2001, Texas remained first in crushed stone, second in construction sand and gravel and salt, second of three crude helium-producing States, second in common clay, ball clay, talc, and zeolites, and second of two States that produce brucite. The State continued to be fifth in lime, as well as one of the top five States in the production of industrial sand and gravel and gypsum, and eighth in masonry cement. Texas rose to first from second in portland cement and dropped to fifth from fourth in the production of dimension stone.

The Texas metal industry produced copper, primary aluminum, raw steel, and smaller amounts of other metals. Sources of plant feed included ores and scrap metal acquired from other domestic or foreign sources. Texas produced 3.6 million metric tons of raw steel, as reported by the American Iron and Steel Institute. Based upon USGS data, the State increased in rank to fifth from seventh in primary aluminum production.

The following narrative information was provided by the Texas Bureau of Economic Geology[3] (BEG). The nonfuel raw mineral industry of Texas continued to grow during 2001. The increase in population and growth in industry spurred activity in mineral production by creating a demand for materials used in developing infrastructure. Production of aggregate and other industrial minerals needed for manufacturing building products again responded to increased construction activity. Annual job growth in mining, reported by the Texas Labor Market Review, increased by 4.8% from December 2000 through December 2001; this was primarily because of an increase in oil and gas activity statewide (Griffis, 2000, 2001). Although the production and value of some nonfuel minerals (especially those of construction materials) was up during 2001, the overall job growth rate in the nonfuel mineral industry of Texas saw only a slight increase. Records of the Texas Workforce Commission showed that the construction job annual growth rate fell by 0.6%. Jobs related to clay, glass products, and stone fell by 0.2%, and those related to concrete, gypsum, and plaster products increased by 2.9%.

According to the BEG, some interest in previously mined metals properties existed during the past several years. The Shafter District, located in Presidio County, produced nearly 1.1 million kilograms (35 million troy ounces) of silver from 1883 to 1942; subsequent exploration has defined a comparable silver resource in a downdip extension of the original ore zone. Silver principally occurs there as oxidized mineralization controlled by tectonic and karst structures in Permian carbonates. Silver Standard Resources Inc. is permitting the Shafter project for silver production. Another property drawing interest was the Red Hills copper deposit about 10 kilometers (km) west of Shafter, which was recently documented as the easternmost porphyry copper-molybdenum system in southwestern North America. New zircon uranium/lead and molybdenite rhenium/osmium analyses for the Red Hills system revealed ages of 64.2 ± 0.2 million years and 60.2 ± 0.3 million years, respectively, indicating that the intrusion and mineralization are distinctly older than all other Tertiary magmatism (48 million to 17 million years) in Trans-Pecos Texas. The Red Hills intrusion previously had been postulated to be genetically related to the 32-million-year-old Chinati Mountains caldera, located approximately 1 km to the north. The Laramide age for the Red Hills porphyry places it in the same age range as most of the porphyry copper systems (75 million to 54 million years) in Arizona, New Mexico, and northern Mexico (Silver Standard Resources Inc., 2002§[4]).

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[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2001 USGS mineral production data published in this chapter are preliminary estimates as of August 2002 and are expected to change. For some mineral commodities, such as construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Specialist contact information may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals/contacts/comdir.html; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2] Values, percentage calculations, and rankings for 2000 may differ from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also change.

[3] Sigrid Clift, Research Associate, Texas Bureau of Economic Geology, and J. Richard Kyle, Professor, Department of Geological Sciences, University of Texas at Austin, coauthored the text of the State mineral industry information provided by the Texas Bureau of Economic Geology.

References Cited

Griffis, Clayton, ed., 2000, Texas labor market review: Austin, Texas Workforce Commission, December, 10 p.

Griffis, Clayton, ed., 2001, Texas labor market review: Austin, Texas Workforce Commission, December, 12 p.

Internet Reference Cited

Silver Standard Resources Inc, 2002, Shafter silver project, Texas, USA, accessed September 15, 2002, via URL http:/www.silverstandard.com.

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[4] A reference that includes a section twist (§) is found in the Internet Reference Cited section.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN TEXAS 1/ 2/

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral		1999		2000		2001 p/	
		Quantity	Value	Quantity	Value	Quantity	Value
Cement:							
Masonry		261	29,400 e/	268	28,800 e/	250 e/	27,200 e/
Portland		8,680	659,000 e/	9,270	683,000 e/	10,700 e/	788,000 e/
Clays, common		2,100	9,890	2,210	9,460	2,210	9,460
Gemstones		NA	11	NA	11	NA	12
Gypsum, crude		2,230	15,700	1,760	8,980	1,560	8,100
Helium, crude	million cubic meters	W	W	W	W	10	11,100
Lime		1,670 r/	111,000 r/	1,600	105,000	1,550	94,300
Salt		10,200	97,500	10,800	104,000	10,800	104,000
Sand and gravel:							
Construction		77,100	373,000	80,800	408,000	89,000	456,000
Industrial		1,620	37,100	1,750	45,200	1,750	45,200
Stone:							
Crushed		108,000 r/	447,000 r/	121,000	496,000	145,000	612,000
Dimension	metric tons	82,500	24,200	84,700	11,500	84,700	11,500
Talc, crude	do.	220,000	5,000	212,000	3580	259,000	5,860
Zeolites	do.	(3/)	NA	(3/)	NA	(3/)	NA
Combined values of brucite (2000-01), clays (ball, bentonite, fuller's earth, kaolin), helium (Grade-A), sulfur [Frash (1999)]		XX	58,400	XX	44,900	XX	35,900
Total		XX	1,870,000 r/	XX	1,950,000	XX	2,210,000

e/ Estimated. p/ Preliminary. r/ Revised. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined values" data. XX Not applicable.

1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/ Data are rounded to no more than three significant digits; may not add to totals shown.

3/ Withheld to avoid disclosing company proprietary data.

TABLE 2
TEXAS: CRUSHED STONE SOLD OR USED, BY KIND 1/

Kind	1999				2000			
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone	131	103,000 r/	$424,000 r/	$4.12	124	115,000	$468,000	$4.07
Dolomite	2 r/	W	W	3.97 r/	2	W	W	4.23
Marble	14	W	W	14.93	7	W	W	3.94
Calcareous marl	2	W	W	3.87	2	W	W	3.45
Shell	1	W	W	3.55	1	W	W	23.08
Granite	10	21	296	14.10	9	W	W	4.21
Traprock	1	W	W	8.10	1	W	W	8.24
Sandstone and quartzite	6	942	3,480	3.69	5	1,080	6,110	5.65
Volcanic cinder and scoria	2	W	W	3.59	1	W	W	4.48
Miscellaneous stone	13	2,360	9,980	4.24	15	2,400	10,400	4.35
Total or average	XX	108,000 r/	447,000 r/	4.13	XX	121,000	496,000	4.10

r/ Revised. W Withheld to avoid disclosing company proprietary data; included in "Total." XX Not applicable.

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

TABLE 3
TEXAS: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+1 1/2 inch):			
Macadam	W	W	$2.00
Riprap and jetty stone	65	$415	6.38
Filter stone	41	196	4.78
Other coarse aggregate	95	319	3.36
Total or average	201	930	4.63
Coarse aggregate, graded:			
Concrete aggregate, coarse	9,380	48,900	5.21
Bituminous aggregate, coarse	4,750	29,000	6.11
Bituminous surface-treatment aggregate	697	3,710	5.33
Railroad ballast	31	212	6.84
Other graded coarse aggregate	1,940	8,930	4.60
Total or average	16,800	90,800	5.40
Fine aggregate (-3/8 inch):			
Stone sand, concrete	3,990	20,300	5.10
Stone sand, bituminous mix or seal	704	2,900	4.12
Screening, undesignated	168	747	4.45
Other fine aggregate	979	3,430	3.50
Total or average	5,840	27,400	4.69
Coarse and fine aggregates:			
Graded road base or subbase	11,600	42,900	3.71
Unpaved road surfacing	729	2,530	3.47
Terrazzo and exposed aggregate	W	W	5.08
Crusher run or fill or waste	1,120	4,110	3.66
Other coarse and fine aggregates	3,950	14,000	3.55
Total or average	17,400	63,600	3.66
Other construction materials	82	426	5.20
Agricultural:			
Agricultural limestone	48	552	11.50
Poultry grit and mineral food	126	1,070	8.49
Other agricultural uses	28	335	11.96
Total or average	202	1,960	9.69
Chemical and metallurgical:			
Cement manufacture	13,200	47,800	3.62
Lime manufacture	(3/)	(3/)	4.16
Special:			
Asphalt fillers or extenders	(3/)	(3/)	10.19
Other fillers or extenders	574	3,920	6.83
Unspecified: 4/			
Reported	53,100	205,000	3.86
Estimated	12,000	46,000	3.74
Total or average	65,400	251,000	3.84
Grand total or average	121,000	496,000	4.10

W Withheld to avoid disclosing company proprietary data; included with "Other."

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Includes calcareous marl, dolomite, granite, limestone, marble, miscellaneous stone, sandstone and quartzite, shell, traprock, and volcanic cinder and scoria.

3/ Withheld to avoid disclosing company proprietary data; included in "Grand total."

4/ Reported and estimated production without a breakdown by end use.

TABLE 4
TEXAS: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1 1/2 inch) 2/	W	W	W	W	--	--
Coarse aggregate, graded 3/	W	W	W	W	W	W
Fine aggregate (-3/8 inch) 4/	W	W	W	W	W	W
Coarse and fine aggregate 5/	W	W	W	W	W	W
Other construction materials	--	--	1	3	--	--
Agricultural 6/	--	--	--	--	--	--
Chemical and metallurgical 7/	--	--	--	--	W	W
Special 8/	--	--	--	--	--	--
Unspecified: 9/						
Reported	W	W	--	--	3,330	12,800
Estimated	1,200	4,200	140	540	480	1,900
Total	1,840	6,780	819	3,110	5,080	19,800
	District 4		District 5		District 6	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1 1/2 inch) 2/	W	W	W	W	W	W
Coarse aggregate, graded 3/	W	W	5,900	28,700	--	--
Fine aggregate (-3/8 inch) 4/	W	W	2,230	8,830	--	--
Coarse and fine aggregate 5/	W	W	4,160	16,800	W	W
Other construction materials	--	--	38	132	--	--
Agricultural 6/	--	--	W	W	--	--
Chemical and metallurgical 7/	W	W	7,190	27,400	--	--
Special 8/	--	--	W	W	--	--
Unspecified: 9/						
Reported	6,190	23,900	12,600	48,400	--	--
Estimated	560	2,100	4,200	15,000	300	1,200
Total	9,910	43,600	37,200	154,000	448	1,810
	District 7		District 8		District 9	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1 1/2 inch) 2/	W	W	--	--	--	--
Coarse aggregate, graded 3/	8,970	49,000	W	W	--	--
Fine aggregate (-3/8 inch) 4/	3,180	16,200	--	--	--	--
Coarse and fine aggregate 5/	9,720	33,800	W	W	W	W
Other construction materials	43	291	--	--	--	--
Agricultural 6/	--	--	W	W	--	--
Chemical and metallurgical 7/	5,540	19,100	--	--	--	--
Special 8/	W	W	--	--	--	--
Unspecified: 9/						
Reported	23,600	91,000	W	W	W	W
Estimated	5,300	20,000	26	100	150	560
Total	56,700	232,000	5,590	22,500	3,390	12,600

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes filter stone, macadam, riprap and jetty stone, and other coarse aggregate.

3/ Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), railroad ballast, and other graded coarse aggregate.

4/ Includes screening (undesignated), stone sand (bituminous mix or seal), stone sand (concrete), and other fine aggregate.

5/ Includes crusher run (select material or fill), graded road base or subbase, terrazzo and exposed aggregate, unpaved road surfacing, surfacing, and other coarse and fine aggregates.

6/ Includes agricultural limestone, poultry grit and mineral food, and other agricultural uses.

7/ Includes cement manufacture and lime manufacture.

8/ Includes asphalt fillers or extenders and other fillers or extenders.

9/ Reported and estimated production without a breakdown by end use.

TABLE 5
TEXAS: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	27,700	$160,000	$5.80
Concrete products (blocks, bricks, pipe, decorative, etc.) 2/	1,870	10,400	5.57
Asphaltic concrete aggregates and other bituminous mixtures	1,230	11,300	9.14
Road base and coverings	2,630	9,800	3.72
Road stabilization (cement and lime)	489	2,230	4.55
Fill	8,580	19,300	2.25
Other miscellaneous uses 3/	118	1,040	8.80
Unspecified: 4/			
Reported	12,000	69,600	5.81
Estimated	26,000	120,000	4.71
Total or average	80,800	408,000	5.04

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes plaster and gunite sands.

3/ Includes filtration.

4/ Reported and estimated production without a breakdown by end use.

TABLE 6
TEXAS: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3		District 4	
Use	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products 2/	1,310	12,500	W	W	197	1,090	W	W
Asphaltic concrete aggregates and other bituminous mixtures	644	8,160	--	--	--	--	--	--
Road base materials 3/	314	1,460	--	--	--	--	W	W
Fill	115	562	W	W	--	--	15	129
Other miscellaneous uses 4/	--	--	719	3,940	--	--	170	1,390
Unspecified: 5/								
Reported	166	1,100	--	--	1,440	6,970	179	886
Estimated	1,600	7,900	1,200	7,100	160	660	1,700	10,000
Total	4,170	31,700	1,900	11,000	1,800	8,720	2,050	12,500

	District 5		District 6		District 7		District 8	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products 2/	10,100	61,300	W	W	3,280	20,200	9,380	45,700
Asphaltic concrete aggregates and other bituminous mixtures	W	W	--	--	W	W	W	W
Road base materials 3/	649	2,530	W	W	W	W	1,570	4,480
Fill	W	W	--	--	1,600	2,720	4,840	12,400
Other miscellaneous uses 4/	2,100	4,010	514	2,440	507	3,270	210	1,230
Unspecified: 5/								
Reported	2,730	14,800	134	663	2,820	17,300	3,270	14,300
Estimated	4,200	16,000	1,400	7,800	4,500	19,000	8,800	39,000
Total	19,700	98,800	2,070	10,900	12,700	62,800	28,100	117,000

	District 9		Unspecified districts	
	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products 2/	3,900	21,700	47	773
Asphaltic concrete aggregates and other bituminous mixtures	W	W	--	--
Road base materials 3/	W	W	--	--
Fill	5	15	--	--
Other miscellaneous uses 4/	418	2,420	--	--
Unspecified: 5/				
Reported	5	23	1,230	13,500
Estimated	2,700	16,000	--	--
Total	7,040	40,400	1,280	14,200

W Withheld to avoid disclosing company proprietary data; included with "Other miscellaneous uses." -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

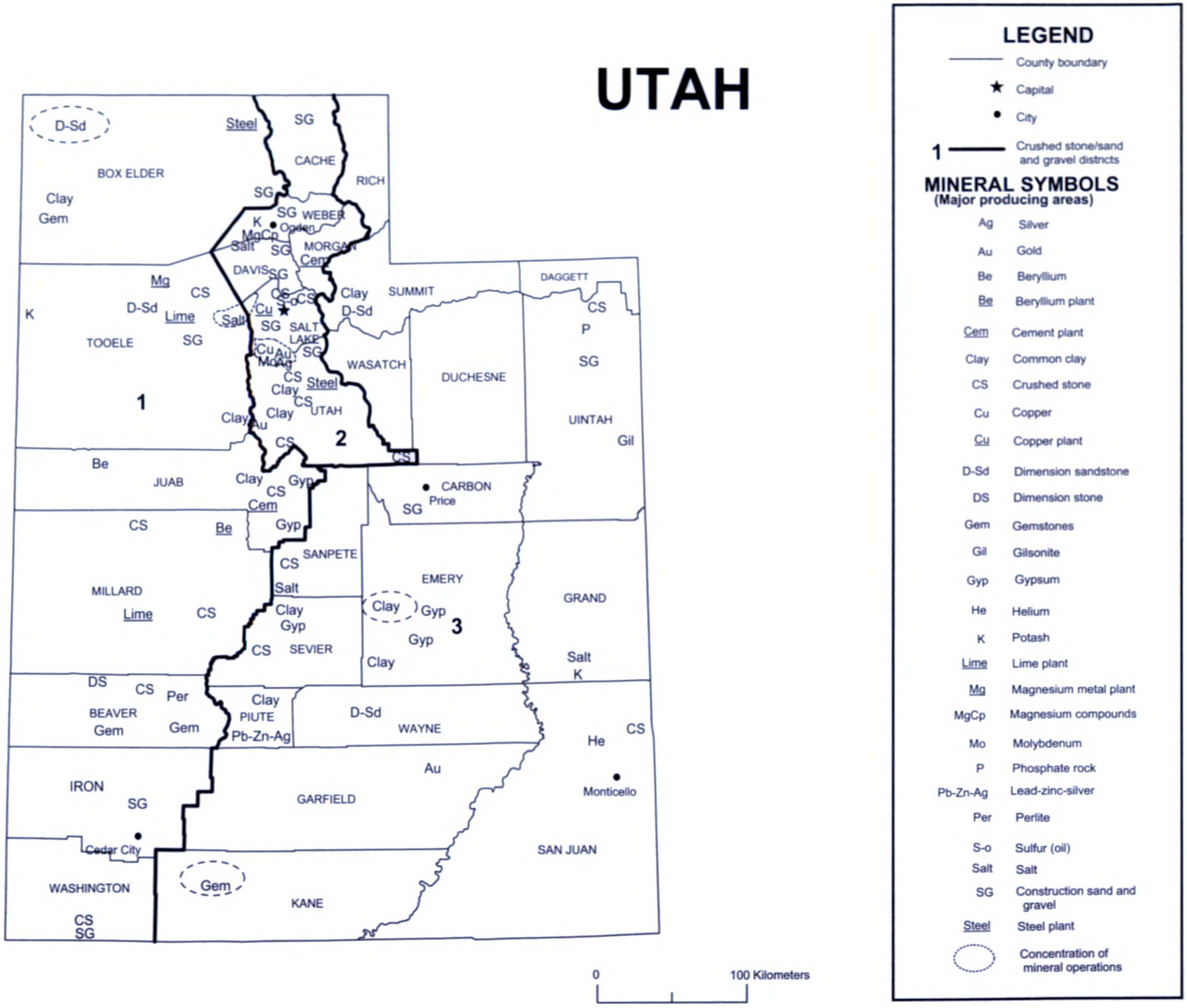
2/ Includes plaster and gunite sands.

3/ Includes road and other stabilization (cement and lime).

4/ Includes filtration.

5/ Reported and estimated production without a breakdown by end use.

UTAH



Source: Utah Geological Survey/U.S. Geological Survey (2001)

THE MINERAL INDUSTRY OF UTAH

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Utah Geological Survey for collecting information on all nonfuel minerals.

In 2001, the estimated value[1] of nonfuel raw mineral production for Utah was $1.53 billion, based upon preliminary U.S. Geological Survey (USGS) data. This was a 5.6% decrease from that of 2000[2] and followed a 7.5% increase from 1999 to 2000. For the second consecutive year, the State was ninth in rank among the 50 States in total nonfuel mineral production value, of which Utah accounted for about 3.5% of the U.S. total.

Metals accounted for about 60% of Utah's nonfuel mineral production value, with copper being significantly more than one-half of the State's entire metal value. In 2001, the most significant change in value in the metals sector was a more than $40 million drop in the value of copper. Similarly, magnesium metal was down more than $25 million in contrast to magnesium compounds that, with a more than doubling of production from that of 2000, was up by about $10 million. Also, the value of molybdenum concentrates was down by $10 million.

In 2000, the rise in Utah's value from that of 1999 was mainly attributable to increases of more than $100 million in copper, $30 million in gold, $16 million in salt, $10 million in molybdenum concentrates, and more than $4 million in lime. The most significant decreases were those of a $16 million drop in the value of construction sand and gravel and a $3 million decrease in crushed stone (table 1).

Based upon USGS estimates of quantities produced in the 50 States during 2001, Utah remained the only State to produce beryllium concentrates; second in copper and gold; second of 2 magnesium-metal- and 3 potash-producing States; fourth in perlite and magnesium compounds and fourth of 4 States that produce phosphate rock; fifth in silver, gemstones, and bentonite; and sixth in salt (each ranking listed in descending order of value). While the State rose to second from third in magnesium compounds, it dropped to third from second in molybdenum concentrates. Additionally, the State was a significant producer of portland cement, construction sand and gravel, and lime.

The Utah Geological Survey[3] (UGS) provided the following narrative information. UGS production data are based upon its own surveys, estimates, and information gathered from company annual reports. These data may differ from some USGS preliminary estimates and final production figures, which are based upon USGS company surveys and estimates.

Production

The value of Utah's mineral production (including coal) in 2001 was estimated to be $1.94 billion, about $27 million more than in 2000. Contributions from each of the major industry segments are as follows: base metals, $693 million (36% of total); industrial minerals, $538 million (28% of total); coal, $473 million (24% of total); and precious metals, $240 million (12% of total). Compared with 2000, the 2001 values of base metals decreased by $56 million, industrial minerals increased by $38 million, coal increased by $17 million, and precious metals increased by $28 million.

In 2001, Utah had 74 active large mines (excluding sand and gravel) that are grouped by industry segment as follows: base metals, 4; precious metals, 2; coal, 12; and industrial minerals (including gemstones, geodes, fossils, and others), 56. In 2001, 97 small mines reported production, 23 fewer than in 2000. These small mines are grouped as follows: base metals, 1; precious metals, 11; and industrial minerals, 85.

Base-metal operations, with an estimated total value of $693 million, were the largest of contributors to the value of minerals produced in Utah in 2001. Those metals, in descending order of value, were copper, magnesium metal, molybdenum, and beryllium. Kennecott Utah Copper Corp.'s Bingham Canyon Mine, west of Salt Lake City, Salt Lake County, is the State's sole producer of copper and molybdenum and a major producer of gold and silver, the combined value of which was more than one-third of the total value of all minerals produced statewide.

Copper production from Kennecott's Bingham Canyon Mine increased slightly in 2001 to 313,000 metric tons (t) of copper contained in concentrates, up from 2000 production of 296,000 t. Kennecott idled its North concentrator in June and closed it permanently at yearend. The company announced that open pit reserves will be exhausted in the next 10 to 12 years and that no decision has been made to extend a portion of the mine underground (Bon and Gloyn, 2002).

Magnesium Corp. of America produces magnesium metal from Great Salt Lake brines at its electrolytic plant at Rowley in Tooele County. The plant, having a capacity of 43,000 metric tons per year (t/yr) of magnesium metal (99.9% purity), was one of only two active primary processing facilities in the United States. By yearend, the Utah facility was the only active plant in the United States. Magnesium production was less than capacity in 2001 because the company was modernizing its plant with the installation of new electrolytic cells.

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[2] Values, percentage calculations, and rankings for 2000 may differ from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also change.

[3] Robert Gloyn, Senior Geologist, and Roger Bon, Industry Outreach Specialist, at the Utah Geological Survey authored the text of the State mineral industry information provided by that agency.

Kennecott's Bingham Canyon Mine, one of six molybdenum-producing mines in the United States in 2001, produced 14,000 t of molybdenum concentrates, containing 8,100 t of molybdenum, a 20% decrease from that of 2000 (Bon and Gloyn, 2002). Molybdenum was recovered as a byproduct from the copper milling operation.

Utah continued to be the Nation's sole producer of beryllium ore (bertrandite), which is mined at Brush Wellman Inc.'s Topaz and Hogs Back mines in Juab County and processed at the company's plant a few miles north of Delta in Millard County. The product (beryllium hydroxide) is then sent to the company-owned refinery and finishing plant in Ohio, where it is converted into beryllium metal, alloys, and oxide. In 2001, 36,000 t of ore was mined and trucked to the processing plant; this was substantially less than previous years because of reduced demand and increased processing of stockpiled ore.

No vanadium or uranium was mined in Utah in 2001, and International Uranium Corp.'s White Mesa mill in San Juan County and U.S. Energy Co.'s Shootaring Canyon mill in Garfield County were idle the entire year. No milling is planned at either facility until there is a significant increase in the price of uranium or vanadium.

Precious-metal production in 2001, which included gold (91% of total value) and silver (9% of total value), was valued at an estimated $240 million. Gold production increased about 10% in 2001 to an estimated 24,100 kilograms (kg), from nearly 21,800 kg in 2000. Gold was mined during 2001 by two companies. Kennecott owned two surface mines—one primary producer (Barneys Canyon Mine) and one byproduct operation (Bingham Canyon Mine), both located in Salt Lake County. Chief Gold Mines, Inc. owned one smaller underground mine, its newly reopened Trixie Mine near Eureka in Utah County. Several other small mines in the State are known to produce minor amounts of gold and silver, but these companies reported no metal-specific information to the UGS. Barneys Canyon Mine, having exhausted its reserves, ended its mining and ore crushing operations in mid-December 2001 but will continue to produce gold for 4 to 5 more years at a reduced rate until its leach pads are depleted. Since the beginning of mining in 1989, the operation has produced about 40,500 kg of gold. Silver production statewide mainly from two sources—a byproduct metal from the Bingham Canyon Mine and a component of polymetallic ore from the Trixie Mine—was estimated to be 140,000 kg, 16,000 kg more than in 2000.

Industrial minerals with an estimated value of $538 million was the second largest contributor to the value of minerals produced in Utah in 2001. The States' major commodities by group or individual commodity (descending order of value) included salines—including salt, magnesium chloride, potash (potassium chloride), and sulfate of potash; crushed stone and sand and gravel; portland cement, lime, limestone, and dolomite; phosphate; gilsonite; expanded shale; gypsum; and common clay and bentonite.

Salt and other brine-derived products, to include magnesium chloride and potash [potassium chloride and sulfate of potash (SOP)], are the largest contributors (up from third largest in 2000) to the value of industrial minerals production in Utah, with a combined value of about $172 million. The statewide production of the same (this excludes magnesium metal) was estimated to be 3.2 million t in 2001, about 90,000 t higher than in 2000. Potash production (including SOP) was estimated to be 304,000 t in 2001, approximately 90,000 t more than in 2000. One company (North Shore Ltd. Partnership) produces a small amount of concentrated brine that is used as an ingredient in mineral food supplements.

Salt production alone was estimated to be 2.5 million t in 2001, about 180,000 t less than in 2000, with most coming from three operators using brine from Great Salt Lake. These operators, in descending order of production, are IMC Kalium Ogden Corp. (formerly GSL Minerals), Cargill Salt Co., and Morton International, Inc. In addition, three other companies produce salt and/or potash from operations not located on Great Salt Lake. They are Reilly Chemical Co. at Wendover in Tooele County (potash), Moab Salt LLC near Moab in Grand County (salt and potash), and Redmond Minerals, Inc. near Redmond in Sanpete County (salt).

Crushed stone (including limestone and dolomite) and sand and gravel were the second highest contributors to the value of industrial minerals produced in 2001, down from first in 2000. These materials are produced in every county in Utah by commercial operators and by Federal, State, and county agencies. Preliminary data compiled by the USGS show that about 28 million metric tons (Mt) of sand and gravel and 11 Mt of crushed stone was produced in 2001, with a combined value of $156 million, compared with 31 Mt of sand and gravel and 8.5 Mt of crushed stone produced in 2000, with a combined value of $151 million (table 1).

Portland cement, lime, limestone, and dolomite collectively were the third highest in value industrial minerals produced in 2001, with a combined value of $134 million. Two operators manufactured portland cement in Utah—Holcim (US) (formerly Holnam, Inc.) and Ash Grove Cement Co. Holcim's Devils Slide plant is east of Morgan in Morgan County, and Ash Grove's Leamington plant is east of Lynndyl in Juab County. Both companies have expanded production capacity, and the two plants have a combined capacity of more than 1.4 million metric tons per year (Mt/yr) of cement. Both plants operated near capacity in 2001, although total production was slightly less than in 2000. In addition to limestone, both companies mined silica that is used for the manufacture of cement—Holcim from diatomite in Skull Valley and Ash Grove from a sandstone quarry near its plant.

Lime production was about 5% lower in 2001 than in 2000. Graymont Western U.S., Inc. (formerly Continental Lime Co.), which produces dolomitic lime and high-calcium lime, and Chemical Lime of Arizona, Inc., which produces dolomitic lime, are the two suppliers of calcined limestone (quicklime) and hydrated lime in Utah, with a combined capacity of more than 0.9 Mt/yr. Both operations serve markets in Utah and surrounding States. Graymont's plant is in the Cricket Mountains, approximately 56 kilometers (km) southwest of

Delta in Millard County, and is rated as 1 of the 10 largest lime plants in the United States. Chemical Lime's plant is about 13 km northwest of Grantsville in Tooele County.

Twelve companies quarried about 1.68 Mt of limestone and dolomite in 2001, which was used mainly in construction, flue gas desulfurization in powerplants, and steelmaking. The three largest suppliers of crushed limestone used in construction are Valley Asphalt Co., from two quarries in Utah County; Harper Construction Co., from one quarry in Salt Lake County; and Pelican Point Rock Products Co. (formerly Larsen Limestone Co.), from one quarry in Utah County. A small amount of limestone and dolomite was also crushed to a fine powder and marketed as "rock dust" to the coal mining industry.

Utah's only phosphate producer, SF Phosphates, Ltd.'s Vernal phosphate operation, is 18 km north of Vernal in Uintah County. SF Phosphates is a partnership of Farmland Industries, Inc. (with headquarters in Missouri) and J.R. Simplot, Inc. (with headquarters in Idaho). The company mines 2.7 Mt of ore, which is processed into about 0.9 Mt of concentrate and transported in slurry form to the company's Rock Springs, WY, fertilizer plant via a 144-km-long underground pipeline. During 2001, the Vernal operation mined more than 3.4 Mt of ore, the highest production level in the past 10 years (Bon and Gloyn, 2002).

Gilsonite production, which has been relatively stable for the past several years, was estimated to be 54,000 t in 2001, essentially the same as that of 2000. Gilsonite is an unusual solid hydrocarbon that has been mined in Utah for more than 100 years. The three companies that mine gilsonite all have mines near Bonanza in eastern Uintah County. In descending order of production, they are American Gilsonite Co. (Bonanza mine), Zeigler Chemical and Minerals Co. (Cowboy, Neal State, and Hardaway Mines), and Lexco, Inc. (Cottonwood Mine). Gilsonite is marketed worldwide for use in more than 150 products ranging from printing inks to explosives.

Utelite, Inc. mined 180,000 t of shale in 2001, the same as in 2000, to manufacture "expanded shale" for use as a lightweight aggregate for the construction industry. The mine is located near Wanship in Summit County.

Seven companies mined 350,000 Mt of gypsum from 10 pits in 2001, nearly 100,000 Mt less than in 2000. In descending order of production, the companies are U.S. Gypsum Co., Georgia Pacific Corp.; Nephi Gypsum, Inc.; H.E. Davis and Sons; Nephi Sandstone Co.; D.K. Gypsum Industries; and Western Clay Co. Both U.S. Gypsum and Georgia Pacific operate wallboard plants near Sigurd in Sevier County. The majority of gypsum produced in Utah is used for making wallboard, but several operators supply raw gypsum to regional cement companies where it is used as an additive to retard the setting time of cement and to the agriculture industry for use as a soil conditioner.

More than 247,000 t of common clay and 41,000 t of bentonite were mined by nine companies in 2001, a 16% decrease in common clay and a 25% decrease in bentonite compared with 2000. The four largest common clay mines, in descending order of production, are Interstate Brick Co., Peck Rock Products Co., Interpace Industries, and Paradise Management Co. More than 75% of all common clay is used in the manufacture of brick. Bentonite is used as a sealant in many civil engineering applications, as a pet-waste absorbent (litter-box filler), as an additive in oil and gas drilling fluids, and as a binder in foundry molds.

The value of nonfuel raw mineral production in Utah is expected to decrease moderately in 2002. Operator surveys indicate that both base- and precious-metal production will be lower, coupled with continued low metal prices. Industrial mineral values will also trend lower with lower sand and gravel production partially offset by an increase in that of crushed stone. The production of cement and lime was expected to remain nearly the same as in 2001.

Exploration and Development

During 2001, the Utah Division of Oil, Gas and Mining (DOGM) received 5 large mine permit applications (2 hectares and larger disturbance) and 32 new small mine permit applications (less than 2 hectares disturbance). The five large mine applications were made to change from small to large mine classification and to include four dimension stone quarries and one tar-sand pit. The 32 new small mine applications include 29 for industrial minerals (including gemstones, geodes, fossils, and others) and 3 for precious metals.

Kennecott Utah Copper Co. announced that open pit mining at the Bingham Canyon copper mine likely will end in 2012. Previous announcements made before the drop in copper prices estimated completion of open pit mining at 2020 or even later. No decision has been announced on underground mining of either porphyry or skarn ore, which would extend the life of the operation. Published underground reserves (proven and probable) include 321 Mt of "block cave" (porphyry) ore and 14 Mt of skarn ore (Rio Tinto Annual Report, 2000).

Chief Gold Mines, Inc. (100% owned by Chief Consolidated Mining Co.) initiated development of its recently discovered 75-85 extension ore body at the Trixie Mine in the East Tintic district. The ore body was reached in October 2001, and by yearend, approximately 4,500 t of ore had been mined with an average mined grade of 25.7 grams per metric ton (g/t) gold and 85.7 g/t silver. Mining is continuing at a rate of 90 to 140 metric tons per day (t/d).

The new corporation Western Utah Copper Co. (WUCC) has substantially consolidated all of the major copper districts (San Francisco, Beaver Lake, and Rocky Range districts) in western Beaver County. In late January 2002, WUCC entered into a purchase agreement to acquire all of the holdings of Nevada Star Resources Corp. WUCC plans to initially develop the identified resources by underground mining and has hired Western Mine Development, Inc. to conduct its underground operations. The first mining operation will be on the higher grade skarn deposits in the Rocky Range district northwest of Milford. The company plans an aggressive exploration program in conjunction with mining and developing its reserves.

During 2001, Unico Inc. continued rehabilitation of the Deer Trail Mine, located southwest of Marysvale in Piute County, and began mining in the 3400 area. Three stopes were developed on two high-grade manto horizons on the PTH tunnel level and approximately 2,700 t of ore was mined and stockpiled. The mantos currently being mined in the 3400 area are 1.2 to 1.5 meters (m) thick and contain high-grade ore. Based on sampling of the workings, the ore averages 4.8 g/t gold, 1,030 g/t silver, 8.4% lead, 17% zinc, and 1.3% copper.

In September 2001, Unico signed a lease/option agreement with Kaibab Industries covering 6 patented and 21 unpatented claims in the Bromide Basin area east of Mount Ellen in northern Garfield County. During the summer, Unico mapped and took bulk samples of the high-grade gold-bearing Bromide and Crescent veins and the Kimble-Turner shear zone. Unico planned to continue developing the properties in 2002 by extending the El Dorado adit by 210 m to intersect the Bromide and Crescent veins 90 and 150 m, respectively, below the adit levels and stoping up on the veins. Unico planned to mine 68 to 90 t/d during the 6 summer months when the property is accessible.

In mid-2001, Atlas Mining Co. (Osburn, ID) signed a lease/option agreement on the Dragon halloysite property in the southern part of the Tintic district approximately 4 km south of Eureka. The company intends to build a processing plant and begin mining the deposit at an initial rate of 6,800 t/yr ramping up to 27,000 t/yr. Announced reserves are 270,000 t; the total resource is estimated at 0.9 Mt.

In August 2001, Gemstone Mining Inc. (GMI) ceased mining and closed the processing plant on the Red Emerald (formerly Ruby Violet) red beryl mine in southern Beaver County. The mine was the only known source of gem-quality red beryl in the world. Several months earlier, GMI had failed to make the final payment for purchase of the property. The underlying owners began foreclosure procedures, and the matter was in litigation.

Base- and precious-metal exploration remained at a very low level in 2001. The DOGM received 14 new notices of intent (NOIs) to explore, one less than in 2000 and significantly lower than the 50 to 60 per year received during the early 1990s. Six NOIs were for precious or base metals, two for sandstone, two for limestone, two for slate, and the remaining two for kaolin and humate. Four of the base- or precious-metal NOIs were from individuals, and two were from small- to medium-sized companies. The new NOIs listed by county include Beaver, two; Duchesne, one; Emery, one; Juab, two; Kane, one; Millard, one; San Juan, one; Sanpete, one; Utah, two; and Washington, two.

The Milford area was the most active in metals exploration in the State. Exploration and drilling was done by several companies and individuals, including WUCC; Sepa Resources, Inc.; and Breccia Development Co. Most drilling activity was in the Frisco area, but a few holes were drilled on the east side of the Star Range and northwest of Blue Mountain. Most exploration was for copper and precious metals, but two projects were for kaolinite and/or alunite. In the San Francisco district, several holes intersected ore-grade copper and gold, but no discoveries were announced.

Other exploration areas include the East Tintic district and the West Desert. In the East Tintic district, three holes were drilled on a Trixie-like target, and all intersected anomalous precious metals with one 1.5-m intercept assaying 17.4 g/t gold. In the West Desert district, owners and vendors of gold prospects reported increased interest from companies but few firm offers to lease or acquire the properties.

Reference Cited

Bon, R.L., and Gloyn, R.W., 2002, Utah, in Annual review 2001: Mining Engineering, v. 54, no. 5, May, p. 81-87.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN UTAH 1/ 2/

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral		1999		2000		2001 p/	
		Quantity	Value	Quantity	Value	Quantity	Value
Beryllium concentrates	metric tons	5,070	6	4,510	5	4,510	5
Clays, common		327	4,600	335	5,380	335	5,380
Gemstones		NA	1,040	NA	1,030	NA	1,020
Salt		1,890	92,000	2,110	108,000	2,370	87,500
Sand and gravel, construction		39,500	125,000	30,900	109,000	27,800	99,500
Stone, crushed		8,550 r/	44,400 r/	8,520	42,100	11,000	56,000
Combined values of cement (portland), clays (bentonite), copper, gold, gypsum (crude), helium (Grade-A), lime, magnesium compounds, magnesium metal, molybdenum concentrates, perlite (crude), phosphate rock, potash, silver, stone (dimension quartzite and sandstone) indicated by symbol W		XX	1,060,000	XX	1,160,000 r/	XX	1,100,000
Total		XX	1,330,000	XX	1,430,000 r/	XX	1,350,000

p/ Preliminary. r/ Revised. NA Not available. XX Not applicable.

1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/ Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 2
UTAH: CRUSHED STONE SOLD OR USED, BY KIND 1/

Kind	1999				2000			
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone 2/	21 r/	4,830 r/	$30,400 r/	$6.29 r/	20	4,840	$23,600	$4.87
Dolomite	3	2,810	9,030	3.21	3	2,350	8,310	3.54
Sandstone and quartzite	4	W	W	W	4	W	W	W
Volcanic cinder and scoria	3	W	W	W	4	W	W	W
Miscellaneous stone	6	241 r/	1,130 r/	4.69 r/	9	527	4,110	7.80
Total or average	XX	8,550 r/	44,400 r/	5.19 r/	XX	8,520	42,100	4.94

r/ Revised. W Withheld to avoid disclosing company proprietary data; included in "Total." XX Not applicable.

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Includes limestone-dolomite reported with no distinction between the two.

TABLE 3
UTAH: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+ 1 1/2 inch):			
Macadam	W	W	$3.30
Riprap and jetty stone	38	$271	7.13
Other coarse aggregate	275	916	3.33
Coarse aggregate, graded:			
Bituminous aggregate, coarse	27	110	4.07
Bituminous surface-treatment aggregate	2	7	3.50
Railroad ballast	(3/)	(3/)	6.30
Fine aggregate (-3/8 inch):			
Stone sand, bituminous mix or seal	35	125	3.57
Screening, undesignated	244	1,440	5.89
Other fine aggregate	328	1,190	3.64
Coarse and fine aggregates:			
Graded road base or subbase	419	1,580	3.78
Unpaved road surfacing	(3/)	(3/)	3.75
Terrazzo and exposed aggregate	(3/)	(3/)	21.33
Crusher run or fill or waste	(3/)	(3/)	3.41
Other construction materials	4	13	3.25
Agricultural:			
Agricultural limestone	50	803	16.06
Other agricultural uses	3	85	28.33
Chemical and metallurgical:			
Cement manufacture	2,340	15,100	6.45
Lime manufacture	(3/)	(3/)	3.59
Dead-burned dolomite manufacture	(3/)	(3/)	4.62
Flux stone	(3/)	(3/)	17.38
Sulfur oxide removal	(3/)	(3/)	6.06
Special, mine dusting or acid water treatment	(3/)	(3/)	4.40
Unspecified: 4/			
Reported	2,490	9,140	3.68
Estimated	490	2,200	4.53
Total or average	8,520	42,100	4.94

W Withheld to avoid disclosing company proprietary data; included with "Other."

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Includes dolomite, limestone, limestone-dolomite, miscellaneous stone, sandstone and quartzite, and volcanic cinder and scoria.

3/ Withheld to avoid disclosing company proprietary data; included in "Total."

4/ Reported and estimated production without a breakdown by end use.

TABLE 4
UTAH: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3		Unspecified districts	
Use	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Construction:								
Coarse aggregate (+1 1/2 inch) 2/	--	--	W	W	W	W	--	--
Coarse aggregate, graded 3/	W	W	W	W	--	--	--	--
Fine aggregate (-3/8 inch) 4/	W	W	W	W	W	W	--	--
Coarse and fine aggregate 5/	W	W	W	W	W	W	--	--
Other construction materials	--	--	4	13	--	--	--	--
Agricultural 6/	W	W	W	W	--	--	--	--
Chemical and metallurgical 7/	2,780	13,400	W	W	W	W	--	--
Special 8/	W	W	--	--	--	--	--	--
Unspecified: 9/								
Reported	2	8	2,320	8,280	80	422	86	430
Estimated	60	280	430	1,900	--	--	--	--
Total	3,460	18,200	4,840	22,600	132	878	86	430

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes macadam, riprap and jetty stone, and other coarse aggregate.

3/ Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, and railroad ballast.

4/ Includes screening (undesignated), stone sand (bituminous mix or seal), and other fine aggregate.

5/ Includes crusher run (select material or fill), graded road base or subbase, terrazzo and exposed aggregate, and unpaved road surfacing.

6/ Includes agricultural limestone and other agricultural uses.

7/ Includes cement manufacture, dead-burned dolomite manufacture, flux stone, lime manufacture, and sulfur oxide removal.

8/ Includes mine dusting or acid water treatment.

9/ Reported and estimated production without a breakdown by end use.

TABLE 5
UTAH: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	5,360	$22,600	$4.22
Plaster and gunite sands	67	486	7.25
Asphaltic concrete aggregates and other bituminous mixtures	1,930	8,340	4.31
Road base and coverings 2/	4,350	16,400	3.77
Fill	2,720	5,950	2.18
Snow and ice control	44	85	1.93
Other miscellaneous uses 3/	168	1,040	6.17
Unspecified: 4/			
Reported	7,770	24,500	3.15
Estimated	8,500	30,000	3.48
Total or average	30,900	109,000	3.52

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes road and other stabilization (cement).

3/ Includes railroad ballast and roofing granules.

4/ Reported and estimated production without a breakdown by end use.

TABLE 6
UTAH: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

Use	District 1		District 2	
	Quantity	Value	Quantity	Value
Concrete aggregate (including concrete sand) 2/	1,110	4,100	3,650	14,900
Asphaltic concrete aggregates and other bituminous mixtures	522	2,280	685	3,260
Road base and coverings 3/	954	3,740	1,630	6,440
Fill	155	303	2,300	5,170
Other miscellaneous uses 4/	52	118	101	476
Unspecified: 5/				
Reported	1,230	4,520	5,640	15,800
Estimated	1,300	4,500	6,700	23,000
Total	5,290	19,500	20,700	69,400
	District 3		Unspecified districts	
	Quantity	Value	Quantity	Value
Concrete aggregate (including concrete sand) 2/	478	3,050	189	1,040
Asphaltic concrete aggregates and other bituminous mixtures	378	1,500	349	1,300
Road base and coverings 3/	1,610	5,830	159	395
Fill	206	389	63	86
Other miscellaneous uses 4/	59	528	--	--
Unspecified: 5/				
Reported	806	4,010	94	157
Estimated	530	1,800	--	--
Total	4,060	17,100	854	2,980

-- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

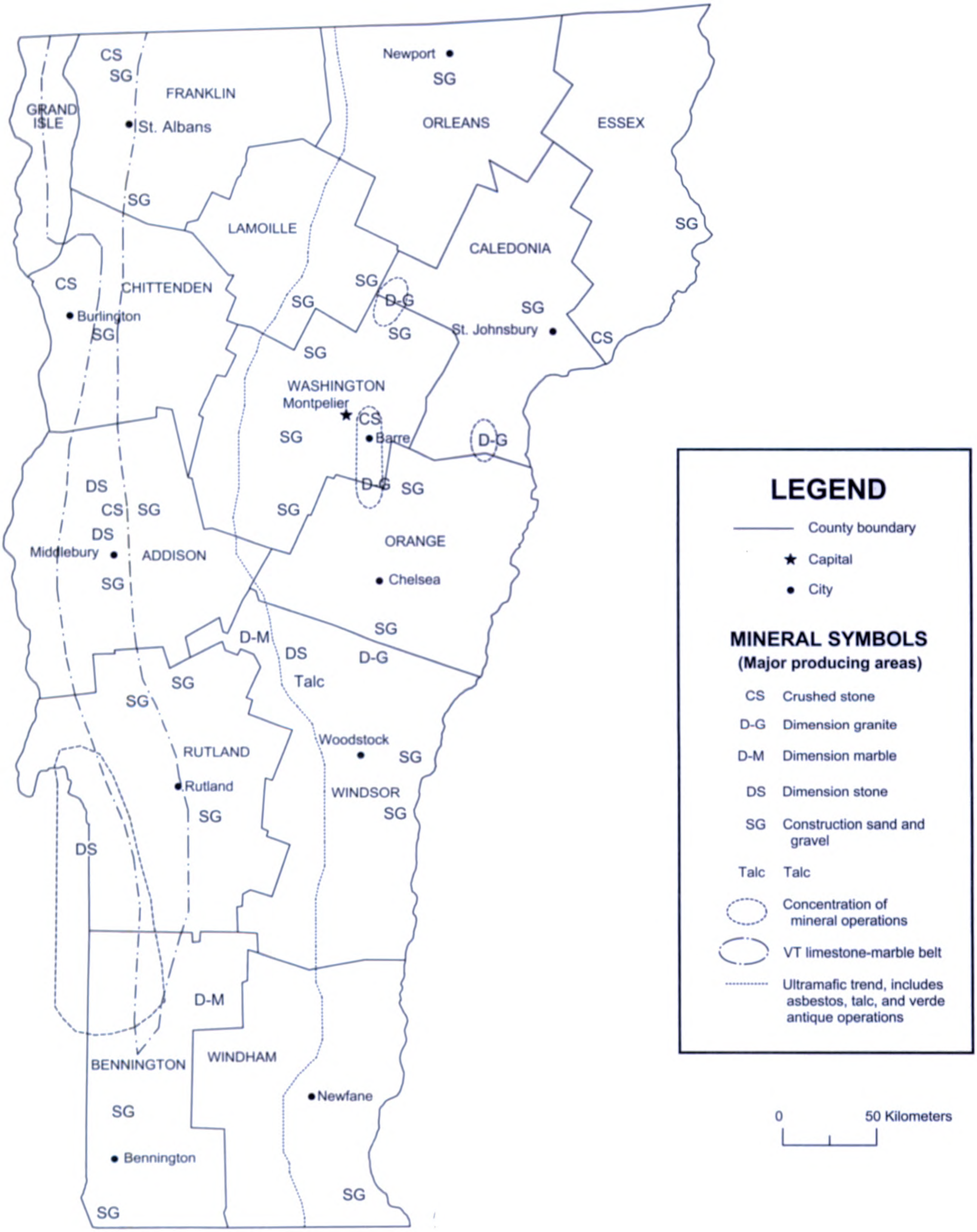
2/ Includes plaster and gunite sands.

3/ Includes road and other stabilization (cement).

4/ Includes railroad ballast, roofing granules, and snow and ice control.

5/ Reported and estimated production without a breakdown by end use.

VERMONT



Source: Vermont Geological Survey/U.S. Geological Survey (2001)

THE MINERAL INDUSTRY OF VERMONT

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Vermont Geological Survey for collecting information on all nonfuel minerals.

In 2001, the estimated value[1] of nonfuel mineral production for Vermont was $68.9 million, based upon preliminary U.S. Geological Survey (USGS) data. This was a 3% increase compared with that of 2000[2] and followed a marginal decrease from 1999 to 2000. Because data for talc have been withheld to protect company proprietary data, the actual total values for 1999-2001 are higher than those reported in table 1.

In 2001, dimension stone was again Vermont's leading nonfuel mineral commodity, accounting for almost 38% of the State's reportable nonfuel mineral value. But construction sand and gravel, up approximately $2.5 million, was the commodity most responsible for the State's increase for the year. In 2000, although dimension stone production and value were up, decreases in the same for crushed stone resulted in the slight net decrease in total nonfuel mineral value (table 1). Although data for talc has been withheld, its value followed the same trend as the State's total value from 1999 through 2001.

Compared with USGS estimates of the quantities produced in the United States during 2000, Vermont remained second among the States that produced dimension stone and third among those producing talc.

The Vermont Geological Survey (VGS) provided the following narrative information,[3] which includes information from the VGS and responses from Rock of Ages Corp. to the annual VGS request for information on the State's quarry and mine operations.

In the granite industry, the Quarries Division at Rock of Ages Corp. reported a "relatively uneventful" 2001 for its quarries located in Vermont. The demand for Barre Gray granite declined during 2001 to the lowest level of demand in the modern history of the Barre, VT, quarries. On the other hand, demand for Bethel White granite from the company's quarry in Bethel continued to be relatively strong in the Asian and European markets. Employment levels in the Barre quarries reached an alltime low, and workers were shifted, where possible, to the quarry in Bethel.

During 2001, Rock of Ages continued the introduction and the use of water-jet technology in the Barre Gray quarries for the channeling process. The water jet was used in conjunction with other types of channeling equipment such as the diamond wire saw and slot drill. The technology was still under evaluation.

Imports of finished monuments from overseas diminished the demand for Barre Gray granite. Rock of Ages therefore made every attempt to increase export activity from its many quarries located in other States and also from the quarry in Bethel.

As a result of increased exports and other endeavors in the export markets, Rock of Ages Corp.'s Quarries Division was awarded the Exporter of the Year award for 2001 from the Vermont International Business Council, which is part of the Vermont Chamber of Commerce. The award was presented in May 2002 by the Senior Trade Advisor of the U.S. Chamber of Commerce.

In other industry news, an environmental board ruled in February 2001 that a Rochester, VT, verde antique quarry needed to obtain an Act 250 permit. Act 250 is Vermont's land-use and development law. Vermont Verde Antique International subsequently filed an appeal with the State Supreme Court challenging the environmental board decision.

The Chairman of the Board of the Vermont Granite Museum of Barre reported both the beginning and completion of Phase I construction. The museum will be housed in the newly renovated Jones Brothers granite manufacturing company building. Renovation of the exterior of the granite shed on the Barre-Montpelier Road was the first stage in the development of the museum. The building was officially designated on the National Register for Historic Places, and all rehabilitation was done according to the U.S. Department of the Interior's Standards for Historic Preservation. The focus of the ambitious project, currently at its halfway point of completion, is on bringing a world-class museum and a Stone Arts School to central Vermont.

Government Programs

The VGS, also known as the Division of Geology and Mineral Resources in Vermont's Department of Environmental Conservation, conducts surveys and research of the geology, mineral resources, and topography of the State. The VGS has of late concentrated its efforts mostly upon completion of the bedrock map of Vermont, new surficial mapping of the State by quadrangle and watershed, and a natural hazard map program. Current mapping projects address societal issues in Vermont:

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[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2001 USGS mineral production data published in this chapter are preliminary estimates as of August 2002 and are expected to change. For some mineral commodities, such as construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Specialist contact information may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals/contacts/comdir.html; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2] Values, percentage calculations, and rankings for 2000 may differ from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also change.

[3] Marjorie Gale, Environmental Scientist III-Geologist with the Vermont Geological Survey, authored the text of the State mineral industry information provided by that agency.

landslide hazard, riverine erosion, and naturally occurring radionuclides in bedrock and ground water. Digital surficial and bedrock data are also used to customize HAZUS, an earthquake hazard computer program, to make it realistically simulate local Vermont conditions.

The State Geologist manages interdisciplinary studies with strong geologic components, especially those focused on surface waters, ground water resources, and geologic hazards. Review of projects as they relate to Criteria 9D and 9E of the aforementioned Act 250 is a VGS activity that recognizes the importance of lands with high potential for extraction of mineral and earth resources. The VGS also reviews and makes recommendations regarding mine and quarry reclamation plans in response to current environmental concerns. Published reports are prepared and made available to the public, consultants, industry, and government, providing geologic aid and advice to the public as required by State statute.

The VGS also provides advice concerning the development and working of rock and mineral deposits suitable for building, roadmaking, and economic purposes. The VGS maintains an archive of old and new information as per State statute. In the event of any significant discovery of hydrocarbons in the State, the VGS provides geologic services for Vermont's Natural Gas and Oil Resources Board. Additional information about the VGS is available on the Internet at URL http://www.anr.state.vt.us/geology/vgshmpg.htm.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN VERMONT 1/ 2/

(Thousand metric tons and thousand dollars unless otherwise specified)

		1999		2000		2001 p/	
Mineral		Quantity	Value	Quantity	Value	Quantity	Value
Gemstones		NA	1	NA	1	NA	1
Sand and gravel, construction		4,430	18,800	4,140	18,800	4,600	21,300
Stone:							
Crushed		5,400	22,800	5,210	21,500	5,100	21,600
Dimension	metric tons	98,600	25,600	103,000	26,600	103,000	26,000
Talc, crude	do.	W	(3/)	W	(3/)	W	(3/)
Total		XX	67,200	XX	66,900	XX	68,900

p/ Preliminary. NA Not available. W Withheld to avoid disclosing company proprietary data. XX Not applicable.

1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/ Data are rounded to no more than three significant digits; may not add to totals shown.

3/ Value excluded to avoid disclosing company proprietary data.

TABLE 2
VERMONT: CRUSHED STONE SOLD OR USED, BY KIND 1/

	1999				2000			
Kind	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone	8	2,440	$10,400	$4.27	7	2,210	$8,780	$3.98
Dolomite	3	W	W	W	3	W	W	W
Granite	3 r/	263	1,190	4.51	3	268	1,930	7.18
Marble	3	1,680	7,390	4.41	2	W	W	W
Quartzite	1 r/	W	W	W	1	W	W	W
Slate	1	W	W	W	1	W	W	W
Total or average	XX	5,400	22,800	4.23	XX	5,210	21,500	4.12

r/ Revised. W Withheld to avoid disclosing company proprietary data; included in "Total." XX Not applicable.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 3
VERMONT: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+1 1/2 inch):			
Riprap and jetty stone	W	W	$9.40
Other coarse aggregate	77	$372	4.83
Coarse aggregate, graded:			
Concrete aggregate, coarse	114	506	4.44
Bituminous aggregate, coarse	W	W	3.92
Railroad ballast	W	W	3.96
Other graded coarse aggregate	270	1,380	5.09
Fine aggregate (-3/8 inch):			
Stone sand, bituminous mix or seal	W	W	8.00
Other fine aggregate	246	986	4.01
Coarse and fine aggregates:			
Graded road base or subbase	609	2,160	3.55
Unpaved road surfacing	185	788	4.26
Crusher run or fill or waste	W	W	3.38
Other coarse and fine aggregates	23	135	5.87
Unspecified: 3/			
Reported	346	1,430	4.14
Estimated	3,300	14,000	4.10
Total or average	5,210	21,500	4.12

W Withheld to avoid disclosing company proprietary data; included with "Other."

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes dolomite, granite, limestone, marble, quartzite, and slate.

3/ Reported and estimated production without a breakdown by end use.

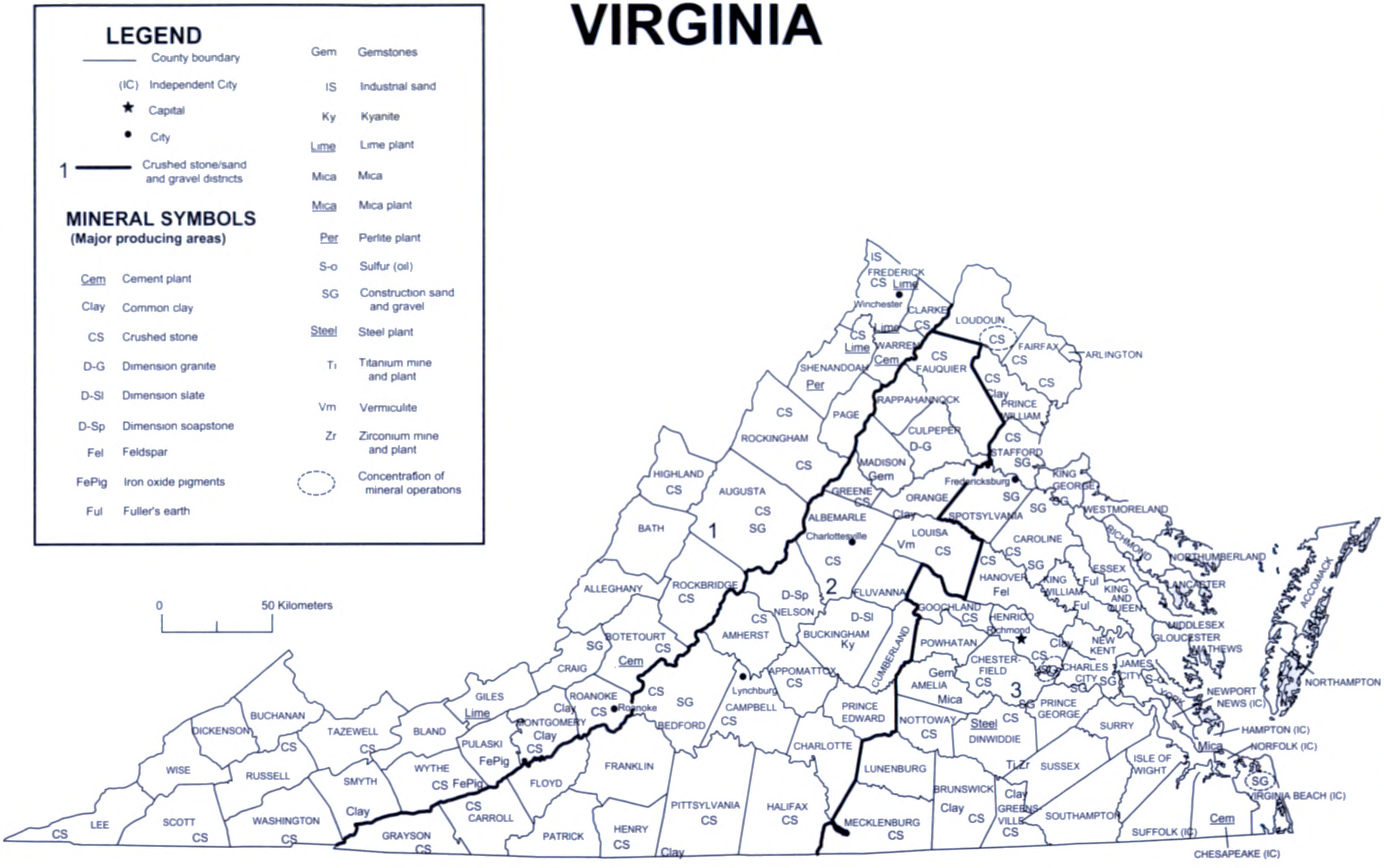
TABLE 4
VERMONT: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	484	$3,130	$6.47
Plaster and gunite sands	5	51	10.20
Asphaltic concrete aggregates and other bituminous mixtures	233	1,760	7.57
Road base and coverings	1,040	5,540	5.33
Fill	237	646	2.73
Snow and ice control	203	634	3.12
Other miscellaneous uses	53	330	6.23
Filtration	12	90	7.50
Unspecified: 2/			
Reported	244	857	3.51
Estimated	1,600	5,800	3.56
Total or average	4,140	18,800	4.55

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Reported and estimated production without a breakdown by end use.

VIRGINIA



Source: Virginia Department of Mines, Minerals and Energy/U.S. Geological Survey (2001)

THE MINERAL INDUSTRY OF VIRGINIA

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Virginia Department of Mines, Minerals and Energy for collecting information on all nonfuel minerals.

In 2001, the estimated value[1] of nonfuel raw mineral production for Virginia was $751 million, based upon preliminary U.S. Geological Survey (USGS) data. This was a 5.8% increase from that of 2000[2] and followed a 9.2% increase from 1999 to 2000. Virginia rose in rank to 18th from 21st among the 50 States in total nonfuel mineral production value, of which the State accounted for nearly 2% of the U.S. total.

Crushed stone was, by value, Virginia's leading raw nonfuel mineral, accounting for more than 60% of the State's total mineral production value. From 1990 through 2001, the State produced nearly 700 million metric tons of crushed stone, or an average of almost 58 million metric tons per year. Cement (masonry and portland) was the second leading nonfuel mineral commodity, followed by construction sand and gravel and lime. These four mineral commodities represented 88% of the State's nonfuel mineral value. In 2001, an increase in the value of crushed stone plus smaller increases in ilmenite and portland cement accounted for most of Virginia's increase in value for the year (table 1). (All listings by value are in descending order of change.) In 2000, the increased values of crushed stone (up $35 million), portland cement (up about $20 million), construction sand and gravel (up nearly $10 million), and zirconium (zircon) (up more than $5 million) led the State's increase in value. The largest decreases were those of about $3 million each in masonry cement and lime, as well as a somewhat smaller decrease in gypsum; all other changes were of less than $1 million.

Based upon USGS estimates of quantities produced in the 50 States during 2001, Virginia remained the only State to mine kyanite; 2d in feldspar; 2d in both titanium (ilmenite) and zirconium (zircon), each being produced only in Virginia and Florida; 2d of 2 vermiculite-producing States; one of the top 6 fuller's earth-producing States; 9th in crushed stone; 10th in lime; and virtually tied for 10th in common clays. Although the only producing kyanite mine and calcined kyanite (mullite) facilities in the United States were in Virginia, synthetic mullite, which is a calcined bauxite, was produced in one other State. About 90% of the U.S. kyanite and mullite output is used in refractories for the smelting and processing of a variety of metals and in glass and high-temperature ceramics manufacturing. Additionally, significant quantities of cement (both portland and masonry), construction sand and gravel, and industrial sand and gravel were produced in the State.

The following narrative information was provided by the Virginia Division of Mineral Resources[3] (VDMR). Some production data in the text that follows are those reported by the VDMR, based on that agency's own surveys and estimates; data may differ from some USGS preliminary estimates and production figures as reported to and estimated by the USGS.

During 2001, Gold Crown Mining Co. continued to permit the Kentuck Mine, east of Danville in Pittsylvania County. Southern Piedmont Mining Corp. abandoned its permit at the Moss Gold Mine in Goochland County, in March.

Golden Cat, a Division of Ralston Purina Co., continued producing cat box litter at a site about 40 kilometers northeast of Richmond in King William County. According to the VDMR, the production of clay, mined as a raw material at this site since the operation opened in the late summer of 1997, totaled 455,000 metric tons (t) through 2000.

Iluka Resources, Inc., Virginia Old Hickory Operations continued with its heavy-mineral mining and initial processing operations in Dinwiddie County; final processing was done near the town of Stony Creek, in adjacent Sussex County. Operations were expanded in 2000 to allow for more producing capacity. According to the VDMR, since production started in the fall of 1997, 517,000 t of titanium and zirconium concentrates had been produced through 2000.

he Shooting Creek Quarry, LLC, obtained a State permit in late 1998 to reopen the quarry, about 3 miles east of Floyd in Floyd County, that was formerly operated by Pine Creek Stone Co. Shooting Creek began quarrying and processing amphibolite in early 1999; production of about 64,000 t of crushed stone in 2000 was an increase of almost 2.4 times from the year before.

The New World Stone Co. continued to utilize existing soapstone blocks to produce sculpture stone and special orders in Schuyler, Nelson County. Production during 2000 was 105 t.

W. W. Boxley's Blue Ridge Stone Corp. was granted a State permit to quarry limestone for roadstone at the Santana site in September 1999. The quarry will be located along Catawba Creek, north of Fincastle, in Botetourt County. The company reported no production from that site in 2000.

Government Activities and Programs

In 2001, the VDMR continued geologic mapping in several counties at a detailed 1:24,000 scale and continued to map and compile 1:100,000-scale maps. Field studies and compilation of mineral resources on 1:24,000-scale maps continued. Published during the year were reports on the geology of the Virginia portions of the Lindside 1:24,000-scale quadrangle and the Peterstown 1:24,000-scale quadrangle; the geologic map of the Augusta, Bath, Highland, Rockbridge, and Rockingham Counties portions of the Staunton 30 x 60-minute quadrangle; and the geologic map of Clarke, Frederick, Shenandoah, and Warren Counties portions of the 30 x 60-minute quadrangle. Also published during the year were the geologic map of the Augusta, Page, and Rockingham Counties portions of the Charlottesville 30 x 60-minute quadrangle and the Clarke, Page, Rockingham, Shenandoah, and Warren Counties portions of the Front Royal 30 x 60-minute quadrangle. Under STATEMAP, a component of the USGS National Cooperative Geologic Mapping Program (NCGMP), the geologic mapping of the Claybank, Gressit, and Toano 7.5-minute quadrangles was completed, and under the EDMAP component of the NCGMP, maps of Fletcher, Madison, Old Rag, and Thornton Gap 7.5-minute quadrangles were completed. Also published during the year were reports on selected karst features of the southwestern Valley and Ridge province; a hydrogeologic database for Fluvanna County; and an updated directory of the mineral industry in Virginia. Nineteen maps-on-demand depicting the mined portion and extent of coal beds in southwest Virginia, were prepared during the year. Articles published in the VDMR quarterly, Virginia Minerals, pertained to the analyses of carbonate rocks in southwest Virginia; a reference section on the Cambrian-Ordovician rocks near Gate City, VA; imported and exported mineral commodities and products in Virginia; and the geology and history of Confederate saltpeter cave operations in western Virginia. Also, "Geographical and Cultural names in Virginia," originally published in 1974, was reprinted during the year.

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[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2001 USGS mineral production data published in this chapter are preliminary estimates as of August 2002 and are expected to change. For some mineral commodities, such as construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Specialist contact information may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals/contacts/comdir.html; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2] Values, percentage calculations, and rankings for 2000 may differ from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also change.

[3] Palmer C. Sweet, Geologist Supervisor–Economic Geology, Virginia Division of Mineral Resources, authored the text of the State mineral industry information provided by that agency.

A program to digitize all previously published VDMR geologic maps was well underway, with all maps in some stage of completion. The digitized version of the Geologic Map of Virginia (1:500,000-scale) was completed and was in the final stage of editing. It will be issued on CD-ROM as a color raster image accompanied by digital vector data in a variety of standard formats.

In 2001, the Division, in cooperation with Radford University, produced and released the Geology of Virginia CD-ROM 4 on the detailed geology of the "Valley and Ridge" and the "Appalachian Plateaus" physiographic provinces. CD-ROM 1 (2nd edition), "Introduction and Geologic Background," was also published during the year. The CD-ROM series emphasizes the Virginia Standards of Learning in Earth Science. A Teacher's Guide accompanies the CD.

The Mineral Resources of Virginia Database, which contains location and identification information on mines, quarries, prospects, pits, and occurrences, is being updated as ongoing fieldwork is completed.

TABLE 1

NONFUEL RAW MINERAL PRODUCTION IN VIRGINIA 1/ 2/

(Thousand metric tons and thousand dollars unless otherwise specified)

		1999		2000		2001 p/	
Mineral		Quantity	Value	Quantity	Value	Quantity	Value
Clays, common		881	3,240	1,010	2,380	1,010	2,380
Kyanite e/		90	12,700	90	13,400	90	13,400
Sand and gravel, construction		11,300	53,800	12,100	63,200	11,200	59,200
Stone:							
Crushed		66,400	389,000	68,800	424,000	74,000	470,000
Dimension	metric tons	5,640	624	W	W	W	W
Combined values of cement, clays (fuller's earth), feldspar, gemstones, gypsum [crude (1999)], iron oxide pigments (crude), lime, sand and gravel (industrial), talc (crude), titanium (ilmenite), vermiculite, zirconium (zircon), and values indicated by symbol W		XX	176,000	XX	193,000	XX	206,000
Total		XX	650,000	XX	710,000	XX	751,000

e/ Estimated. p/ Preliminary. r/ Revised. W Withheld to avoid disclosing company proprietary data; values included with "Combined values" data.
XX Not applicable.

1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/ Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 2
VIRGINIA: CRUSHED STONE SOLD OR USED, BY KIND 1/

	1999				2000			
Kind	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone 2/	48	20,000 r/	$106,000 r/	$5.32 r/	46	21,300	$118,000	$5.53
Dolomite	10	4,440 r/	26,300 r/	5.92 r/	8	3,850	23,300	6.07
Granite	35	25,400	162,000	6.39	28	26,700	183,000	6.86
Sandstone and quartzite	7 r/	1,620	7,100	4.39	7	1,950	8,590	4.40
Traprock	10	13,800	80,100	5.78	10	13,900	85,000	6.10
Slate	1	W	W	8.79	1	W	W	5.50
Miscellaneous stone	17	W	W	5.94	4	W	W	6.05
Total or average	XX	66,400	389,000	5.86	XX	68,800	424,000	6.16

r/ Revised. W Withheld to avoid disclosing company proprietary data; included in "Total." XX Not applicable.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes limestone-dolomite, reported with no distinction between the two.

TABLE 3
VIRGINIA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+1 1/2 inch):			
Macadam	242	$1,820	$7.51
Riprap and jetty stone	487	4,940	10.15
Filter stone	686	5,050	7.35
Other coarse aggregate	572	4,100	7.16
Coarse aggregate, graded:			
Concrete aggregate, coarse	4,920	36,600	7.43
Bituminous aggregate, coarse	3,070	23,500	7.66
Bituminous surface-treatment aggregate	1,840	14,300	7.82
Railroad ballast	350	2,470	7.05
Other graded coarse aggregate	1,890	11,900	6.27
Fine aggregate (-3/8 inch):			
Stone sand, concrete	426	3,280	7.71
Stone sand, bituminous mix or seal	5.38	3.900	7.25
Screening, undesignated	1,130	7,260	6.45
Other fine aggregate	1,760	7,640	4.35
Coarse and fine aggregates:			
Graded road base or subbase	6,370	41,400	6.50
Unpaved road surfacing	330	2,600	7.88
Terrazzo and exposed aggregate	W	W	9.23
Crusher run or fill or waste	1,190	6,640	5.58
Other coarse and fine aggregates	7,840	47,500	6.06
Other construction materials	61	259	4.25
Agricultural:			
Agricultural limestone	(3/)	(3/)	8.45
Other agricultural uses	(3/)	(3/)	8.99
Chemical and metallurgical:			
Cement manufacture	(3/)	(3/)	3.31
Lime manufacture	(3/)	(3/)	6.68
Special, mine dusting or acid water treatment	(3/)	(3/)	13.62
Other miscellaneous uses and other specified uses not listed	(3/)	(3/)	20.33
Unspecified: 4/			
Reported	24,500	139,000	5.68
Estimated	6,400	34,000	5.31
Total or average	68,800	424,000	6.16

W Withheld to avoid disclosing company proprietary data; included with "Other."

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Includes dolomite, granite, limestone, limestone-dolomite, miscellaneous stone, sandstone and quartzite, slate, and traprock.

3/ Withheld to avoid disclosing company proprietary data; included in "Total."

4/ Reported and estimated production without a breakdown by end use.

TABLE 4
VIRGINIA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1 1/2 inch) 2/	654	4,320	197	1,680	1,140	9,900
Coarse aggregate, graded 3/	3,170	19,800	1,050	7,970	7,840	61,000
Fine aggregate (-3/8 inch) 4/	2,070	10,700	W	W	W	W
Coarse and fine aggregate 5/	5,060	23,000	1,050	6,510	9,620	68,600
Other construction materials	61	259	--	--	--	--
Agricultural 6/	1,000	8,500	W	W	W	W
Chemical and metallurgical 7/	W	W	--	--	--	--
Special 8/	W	W	--	--	--	--
Other miscellaneous uses 9/	W	W	--	--	--	--
Unspecified: 10/						
Reported	1,410	8,190	8,110	46,200	15,000	84,600
Estimated	5,900	31,000	450	2,500	--	--
Total	22,500	122,000	11,300	68,200	35,100	234,000

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes filter stone, macadam, riprap and jetty stone, and other coarse aggregate.

3/ Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), railroad ballast, and other graded coarse aggregate.

4/ Includes screening (undesignated), stone sand (bituminous mix or seal), stone sand (concrete), and other fine aggregate.

5/ Includes crusher run (select material or fill), graded road base or subbase, terrazzo and exposed aggregates, unpaved road surfacing, and other coarse and fine aggregates.

6/ Includes agricultural limestone and other agricultural uses.

7/ Includes cement manufacture and lime manufacture.

8/ Includes mine dusting or acid water treatment.

9/ Includes other specified uses not listed.

10/ Reported and estimated production without a breakdown by end use.

TABLE 5
VIRGINIA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	2,340	$14,100	$6.00
Concrete products (blocks, bricks, pipe, decorative, etc.)	112	1,020	9.13
Asphaltic concrete aggregates and other bituminous mixtures	595	3,090	5.19
Road base and coverings	630	1,690	2.68
Fill	1,900	5,400	2.84
Snow and ice control	43	256	5.95
Unspecified: 2/			
Reported	5,070	32,500	6.41
Estimated	1,400	5,200	3.57
Total or average	12,100	63,200	5.20

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Reported and estimated production without a breakdown by end use.

TABLE 6
VIRGINIA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate (including concrete sand)	W	W	--	--	W	W
Concrete products (blocks, bricks, pipe, decorative, etc.)	--	--	--	--	112	1,020
Asphaltic concrete aggregates and other bituminous mixtures	--	--	74	561	521	2,530
Road base and coverings	W	W	W	W	581	1,350
Fill	W	W	W	W	1,880	5,320
Other miscellaneous uses 2/	375	3,090	11	100	2,070	11,500
Unspecified: 3/						
Reported	168	1,080	40	232	4,860	31,200
Estimated	400	1,900	--	--	1,100	3,300
Total	940	6,050	124	893	11,100	56,200

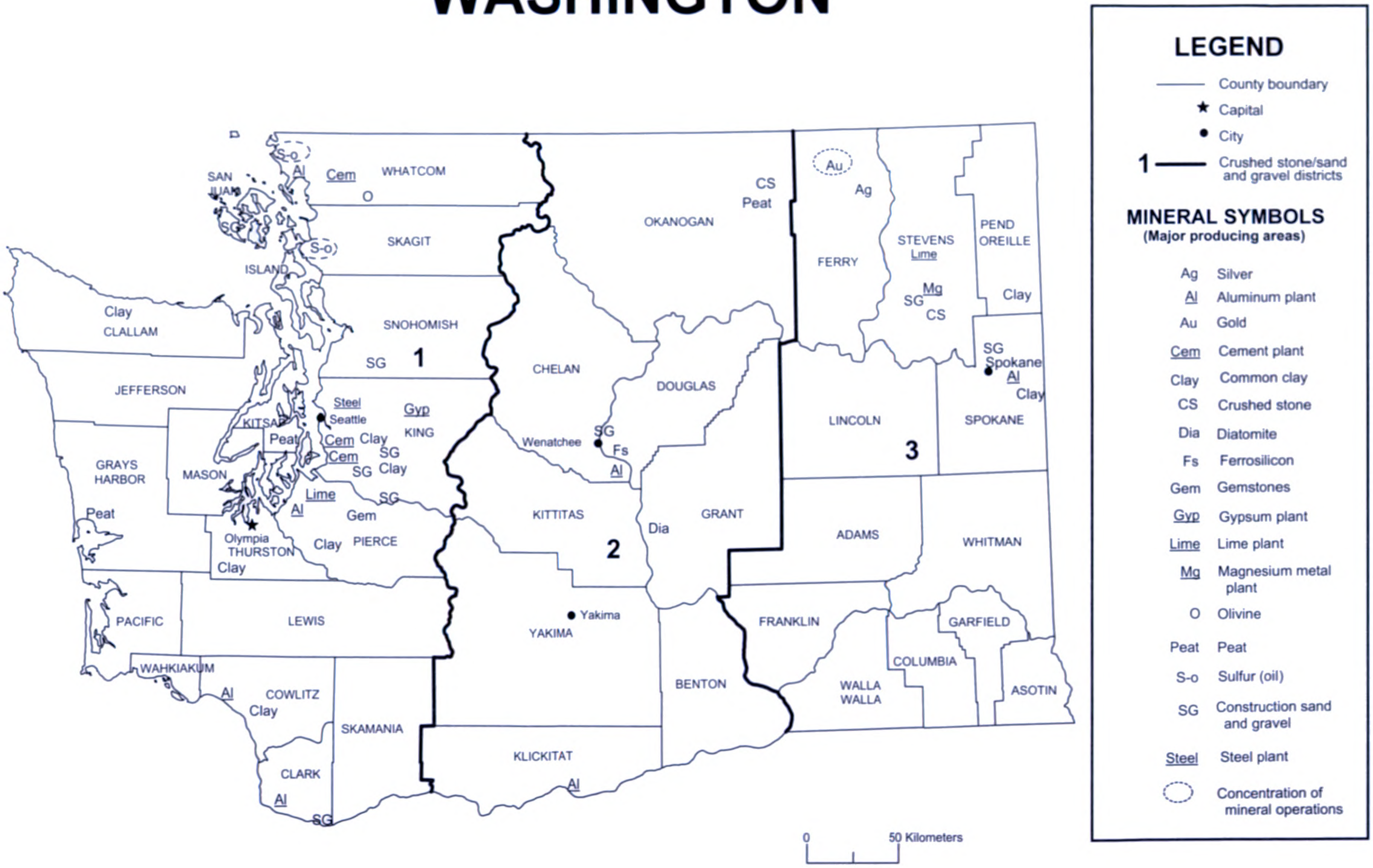
W Withheld to avoid disclosing company proprietary data; included in "Other miscellaneous uses." -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes snow and ice control.

3/ Reported and estimated production without a breakdown by end use.

WASHINGTON



Source: Washington State Division of Geology and Earth Resources/U.S. Geological Survey (2001)

THE MINERAL INDUSTRY OF WASHINGTON

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Washington State Department of Natural Resources, Division of Geology and Earth Resources, for collecting information on all nonfuel minerals.

In 2001, the estimated value[1] of nonfuel mineral production for Washington was $545 million, based upon preliminary U.S. Geological Survey (USGS) data. This was about a 10% decrease from that of 2000[2] and followed an 8.3% decrease from 1999 to 2000. The State ranked 25th (24th in 2000) among the 50 States in total nonfuel raw mineral production value, of which Washington accounted for more than 1% of the U.S. total.

In 2001, based on value, Washington's four leading nonfuel mineral commodities were construction sand and gravel, crushed stone, portland cement, and magnesium metal (in descending order of value), accounting for nearly 90% of the State's total nonfuel mineral value. These were followed by gold and diatomite (together a combined total of 6% of the State's value), lime, and industrial sand and gravel. In 2000, the decrease in value was mostly the result of a $24 million drop in the value of crushed stone; decreases of $13 million and $11 million, respectively, in the values of lime and magnesium metal; and a $6 million decrease in construction sand and gravel (table 1). Decreases of less than $3 million each in gold and portland cement also were a portion of Washington's lowered total value for the year. The most significant increases were the nearly $3 million increase in the value of gypsum and one-half that much in industrial sand and gravel. All other changes in both years were small and inconsequential to the net result.

Based upon USGS estimates of the quantities produced in the 50 States in 2001, Washington remained first of 2 magnesium-metal-producing States, second of 2 States that produce olivine, fourth in diatomite, seventh in construction sand and gravel, and eighth in gold. Additionally, the State was a significant producer of crushed stone. In 2000, Washington dropped to 11th from 1st in the Nation in the production of primary aluminum, the significant decrease resulting from the closing of most of the State's primary aluminum plants owing to highly escalated energy costs. In 2000, Washington accounted for nearly 30% of the U.S. total primary aluminum production. Raw steel was also produced in Washington. Primary aluminum and raw steel were processed from materials received from other domestic and foreign sources.

The Washington State Division of Geology and Earth Resources[3] (DGER) provided the following narrative information. Production data in the text that follows are those reported by the DGER and are based on the agency's own surveys and estimates. They may differ from some production figures reported to the USGS.

Major metal mining operations in Washington in 2001 included gold mining at Republic and magnesium metal production at Addy. There was a dramatic decrease in metal mining by 2002 in part owing to the closing down of magnesium metal operations in October 2001. Battle Mountain Gold Co. became a wholly owned subsidiary of Newmont Mining Corp. and elected to drop its option for the Crown Jewel gold deposit.

Echo Bay Minerals Co. continued mining at the Kettle River Project, an epithermal vein-type deposit in Eocene volcanic rocks of the Republic graben north of Republic in Ferry County. The company mined 201,000 metric tons (t) of ore (1.4 t of contained gold) from the K-2 deposit. The company milled 241,000 t (1.5 t of contained gold) of K-2 ore (including stockpiled ore) and 68,000 t (0.4 t of contained gold) of stockpiled ore from the Lamefoot Mine. Mining had been completed in 2000 at the Lamefoot Mine; however, a small tonnage was removed during rehabilitation operations in 2001. Total gold recovered from K-2 and Lamefoot ores was 1.6 t from 308,000 t of ore; recovery was approximately 85%. Because haulage distances are greater and mining costs are higher, the company expected K-2 production to decrease to 1.1 t of gold in 2002. Echo Bay continued to explore for mineralization to maintain its reserves in the Republic area. Its focus was northeast of the K-2 Mine where the company completed approximately 4,600 meters of drilling from the surface, northeast of the mine. Drilling had not progressed sufficiently at the end of 2001 to allow the company to classify this resource as proven and probable reserves. It planned to continue drilling next year in order to prove this reserve. Echo Bay continued to explore for additional gold reserves in and adjacent to its K-2 gold deposit.

Teck Corp. completed the acquisition of Cominco American, Inc. during 2001. The company is now known as Teck Cominco American Inc. Work to reopen the Pend Oreille lead-zinc mine continued. Because of depressed zinc prices, Teck Cominco elected to delay startup of its mine until 2004. In 2001, the company was preparing the tailings disposal site in preparation for resuming mining at the Pend Oreille Mine. It planned to rehabilitate/modernize the old mill on the property and to ship concentrates to its smelter in Trail, British Columbia, Canada, which is only about 64 kilometers from the mine. Teck Cominco has been working with local citizens to reduce the impact to Pend Oreille County, from the startup as well as for when the mine closes after reserves are depleted. Teck Cominco reported on its Web site reserves for Pend Oreille Mine of 5 million metric tons (Mt) containing 7.3% zinc and 1.3% lead. The company has projected a 10-year mine life at about 730,000 metric tons per year mined. Most of the approximately 13 Mt of previous production, grading 2.3% zinc and 1.1% lead, came from the Josephine horizon. The new reserve at the mine was from a deeper zone called the Yellowhead 1 zone. Teck Cominco has also identified a third ore horizon, which it refers to as the Yellowhead 2 zone.

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[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2001 USGS mineral production data published in this chapter are preliminary estimates as of August 2002 and are expected to change. For some mineral commodities, such as construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Specialist contact information may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals/contacts/comdir.html; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2] Values, percentage calculations, and rankings for 2000 may differ from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also change.

[3] Robert E. Derkey, Geologist, authored the text of the State mineral industry information provided by the Washington State Division of Geology and Earth Resources.

Following its merger with Newmont Mining Corp., Battle Mountain Gold Co. dropped its option on the Crown Jewel gold deposit near Chesaw in Okanogan County. Crown Resources Corp. is now the sole owner of the deposit. It is a skarn-type gold deposit in a sequence of Pennsylvanian to Triassic age clastic and carbonate sedimentary rocks adjacent to the Buckhorn Mountain pluton. Previously announced reserves for the deposit were 8.2 Mt at a grade of 6.4 grams per metric ton (g/t) gold. Crown Resources Corp. proposed mining the deposit primarily as an underground operation and has recalculated the reserves, accordingly; it reported proven and probable reserves were 2.32 Mt grading 11.8 g/t gold (28 t of contained gold) and projected an additional 450,000 t of ore grading at about 13 g/t gold, or about 15 t of contained gold (Derkey and Hamilton, 2002).

Northwest Alloys Inc. ceased magnesium metal production in October at its plant near Addy in Stevens County. The company was no longer able to compete with lower priced foreign sources for magnesium metal. It, however, mined 608,000 t of dolomite in 2001 compared with 575,000 t in 2000 for magnesium metal production. In addition to using some of its reject material from the mine for road aggregate, the company processed some of its byproduct for fertilizer. It planned to continue that process until the byproduct material is expended. Research also continued to find ways to use some of its remaining waste materials.

Nonmetallic mineral commodities produced in Washington were used as bricks, casting sand, cement and fiber cement additives, feed lime, filter material, glass, landscape rock, paper filler, smelter flux, and soil conditioners.

Two companies mined limestone and dolomite for use as a soil conditioner and feed lime in 2001. Pacific Calcium Inc. produced from the Tonasket and Brown quarries in Okanogan County, and Allied Minerals, Inc. produced from the Gehrke quarry in Stevens County. Northwest Alloys sold approximately 10,400 t of smelter slag from its magnesium metal operation at Addy in Stevens County; the slag was used for fertilizer and soil conditioner. Columbia River Carbonates continued to produce calcium carbonate from the Wauconda quarry and to ship it to its processing plant in Longview, Cowlitz County. Most of it is used as a coating agent to produce glossy paper. Northport Limestone Co. mined limestone from the Sherve Quarry in Stevens County and shipped most of it to Trail, British Columbia, Canada, for use as a fluxing agent in smelting. Northwest Marble Products Inc. and the Whitestone Co., both in Stevens County, continued to produce terrazzo tile and building aggregates as they have for a number of years.

Celite Corp. mined and processed approximately 91,000 t of diatomite from its diatomite mine pits in Grant County. The company shipped approximately 59,000 t of finished diatomite; most is used for filtration purposes.

According to the DGER, Olivine Corp. mined 36,000 t of refractory-grade olivine from its Swen Larsen quarry in Whatcom County in 2001. Most of that production was shipped to Unimin Corp., a Belgian company that produces casting sands and other refractory products at Hamilton in Skagit County. The company also reported that initial investigations to produce ornamental olivine appeared successful; the olivine polished very well.

Mutual Materials Co. used about 93,000 t of clay for the manufacture of bricks and related products at its plants in Seattle and Spokane. The company produced from the Mica and Potratz pits in Spokane County and used clay-rich material from the Usk pit in Pend Oreille County. For its Seattle plant, the company obtained clay from the Elk and Section 31 pits in King County and from stockpiled clay from the Clay City pit in Pierce County.

A Canadian company expressed interest in clays derived from weathering of pre-Miocene igneous and metamorphic rocks and deposited in Miocene lake basins around the northeastern margin of Columbia River Basalt. In Spokane County, these clays are known as the Latah Formation. The Canadian company has been evaluating these clays in Idaho as a potential source of kaolinite. Kaolin clay is used to make glossy paper, fine china, paint, and Kaopectate. Should markets be established, these deposits in Spokane and Stevens Counties could become a viable resource. Pacific Coast Coal Co. did not mine any clay from the John Henry #1 coal mine in 2001.

Ash Grove Cement Co. mined 100,000 t of silica ore at the Superior quarry in King County and 14,000 t of clay ore at the Castle Rock quarry in Cowlitz County; the ore was used for portland cement production in Seattle. Ash Grove was exploring for additional silica reserves at Bridge Camp near Enumclaw.

Lane Mountain Silica Co. mined 243,000 t of Addy quartzite from the Lane Mountain quarry in Stevens County. Following processing, the company shipped 96,000 t of high-purity quartz for making glass bottles and jars; 20,000 t, for making fiberglass; and 31,000 t, for sand blasting and filtering and 62,000 t of clay/silica byproduct recovered during processing to make cement at a plant in Richmond, British Columbia, Canada.

Reserve Silica Corp. mined 109,000 t of quartz-rich Puget Group sands from the Ravensdale pit in King County. Following washing the sand, the company shipped 71,000 t; most is used for the manufacture of bottle glass, and some is used for sand traps at golf courses.

The James Hardy Building Products Co. mined 109,000 t of silica in 2001 from its Scatter Creek Mine in King County, most of which it used for the manufacture of fiber cement for Hardy Board products. It also shipped 18,000 t to the LaFarge Corp. cement plant in Seattle for cement manufacture.

Reference Cited

Derkey, R.E., and Hamilton, M.M., 2002, Washington, *in* Annual review 2001: Mining Engineering, v. 54, no. 5, May, p. 88-89.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN WASHINGTON 1/ 2/

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral		1999		2000		2001 p/	
		Quantity	Value	Quantity	Value	Quantity	Value
Cement, masonry		--	--	--	--	W	W
Clays, common		110	W	116	425	116	425
Gemstones		NA	34	NA	37	NA	25
Gold 3/	kilograms	3,250	29,200	2,930	26,400	W	W
Sand and gravel, construction		43,800	227,000	41,800	221,000	41,100	221,000
Silver 3/	metric tons	W	W	2	250	W	W
Stone, crushed		19,300 r/	146,000	18,900	122,000	18,100	120,000
Combined values of cement [masonry (2001), portland], diatomite, gypsum (crude), lime, magnesium metal, olivine, peat, sand and gravel (industrial), stone (dimension miscellaneous), and values indicated by symbol W		XX	260,000	XX	237,000	XX	204,000
Total		XX	662,000 r/	XX	607,000	XX	545,000

p/ Preliminary. r/ Revised. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined values" data. XX Not applicable. -- Zero.

1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/ Data are rounded to no more than three significant digits; may not add to totals shown.

3/ Recoverable content of ores, etc.

TABLE 2
WASHINGTON: CRUSHED STONE SOLD OR USED, BY KIND 1/

Kind	1999				2000			
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone 2/	11	2,120 r/	$47,900 r/	$22.56 r/	11	2,040	$29,300	$14.37
Dolomite	8 r/	531 r/	2,470 r/	4.66 r/	15	687	3,430	4.99
Granite	7	2,120 r/	12,700 r/	6.01 r/	11	2,000	10,900	5.46
Sandstone	5	297	4,340	14.62	3	W	W	13.51
Slate	5	W	W	W	5	W	W	6.56
Traprock	99 r/	13,200 r/	72,100 r/	5.47 r/	107	13,200	71,000	5.38
Volcanic cinder and scoria	2	W	W	W	1	W	W	5.94
Miscellaneous stone	7 r/	864 r/	5,340 r/	6.18 r/	11	544	2,310	4.24
Total or average	XX	19,300 r/	146,000	7.55 r/	XX	18,900	122,000	6.43

r/ Revised. W Withheld to avoid disclosing company proprietary data; included in "Total." XX Not applicable.

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Includes limestone-dolomite reported with no distinction between the two.

TABLE 3
WASHINGTON: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+1 1/2 inch):			
Macadam	W	W	$6.49
Riprap and jetty stone	332	$2,050	6.17
Filter stone	134	868	6.48
Other coarse aggregate	295	1,640	5.55
Coarse aggregate, graded:			
Concrete aggregate, coarse	W	W	5.47
Bituminous aggregate, coarse	70	456	6.51
Bituminous surface-treatment aggregate	43	171	3.98
Railroad ballast	477	2,030	4.25
Other graded coarse aggregate	90	414	4.60
Fine aggregate (-3/8 inch):			
Stone sand, concrete	W	W	7.50
Stone sand, bituminous mix or seal	172	1,080	6.29
Screening, undesignated	118	559	4.74
Other fine aggregate	71	363	5.11
Coarse and fine aggregates:			
Graded road base or subbase	1,640	8,220	5.01
Unpaved road surfacing	786	3,910	4.97
Crusher run or fill or waste	328	1,240	3.77
Other coarse and fine aggregates	786	3,760	4.78
Other construction materials	197	3,045	15.46
Agricultural limestone	(3/)	(3/)	7.20
Chemical and metallurgical:			
Cement manufacture	(3/)	(3/)	5.95
Lime manufacture	(3/)	(3/)	3.42
Flux stone	(3/)	(3/)	12.58
Special:			
Asphalt fillers or extenders	(4/)	(4/)	(4/)
Other fillers or extenders	(3/)	(3/)	129.53
Unspecified: 5/			
Reported	3,600	26,000	7.23
Estimated	8,600	41,000	4.78
Total or average	18,900	122,000	6.43

W Withheld to avoid disclosing company proprietary data; included with "Other."

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Includes dolomite, granite, limestone, limestone-dolomite, miscellaneous stone, sandstone, slate, traprock, and volcanic cinder and scoria.

3/ Withheld to avoid disclosing company proprietary data; included in "Total."

4/ Less than ½ unit.

5/ Reported and estimated production without a breakdown by end use.

TABLE 4
WASHINGTON: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3		Unspecified districts	
Use	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Construction:								
Coarse aggregate (+1 1/2 inch) 2/	712	4,260	W	W	W	W	33	233
Coarse aggregate, graded 3/	272	1,420	47	188	362	1,460	--	--
Fine aggregate (-3/8 inch) 4/	W	W	W	W	W	W	--	--
Coarse and fine aggregate 5/	2,760	13,700	445	1,960	336	1,470	--	--
Other construction materials	20	122	--	--	177	2,920	--	--
Agricultural 6/	--	--	W	W	W	W	--	--
Chemical and metallurgical 7/	W	W	--	--	W	W	--	--
Special 8/	--	--	W	W	W	W	--	--
Other miscellaneous uses 9/	--	--	W	W	--	--	--	--
Unspecified: 10/								
Reported	79	514	1,880	14,000	1,410	10,400	230	1,150
Estimated	6,500	32,000	180	990	1,400	6,100	540	2,000
Total	11,500	58,700	2,770	35,900	3,860	23,800	807	3,420

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes filter stone, macadam, riprap and jetty stone, and other coarse aggregate.

3/ Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), railroad ballast, and other graded coarse aggregate.

4/ Includes screening (undesignated), stone sand (bituminous mix or seal), stone sand (concrete), and other fine aggregate.

5/ Includes crusher run (select material or fill), graded road base or subbase, unpaved road surfacing, and other coarse and fine aggregates.

6/ Includes agricultural limestone.

7/ Includes cement manufacture, flux stone, and lime manufacture.

8/ Includes asphalt fillers or extenders and other fillers or extenders.

9/ Includes other specified uses not listed.

10/ Reported and estimated production without a breakdown by end use.

TABLE 5
WASHINGTON: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	3,470	$27,400	$7.89
Plaster and gunite sands	15	112	7.47
Concrete products (blocks, bricks, pipe, decorative, etc.)	89	1,050	11.78
Asphaltic concrete aggregates and other bituminous mixtures	2,630	18,600	7.06
Road base and coverings	6,560	39,100	5.96
Road stabilization (cement)	478	4,950	10.36
Fill	5,340	19,600	3.68
Snow and ice control	128	541	4.23
Railroad ballast	108	674	6.24
Other miscellaneous uses 2/	537	3,810	7.09
Unspecified: 3/			
Reported	11,800	54,300	4.61
Estimated	11,000	51,000	4.79
Total or average	41,800	221,000	5.29

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Includes filtration.

3/ Reported and estimated production without a breakdown by end use.

TABLE 6
WASHINGTON: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3		Unspecified districts	
Use	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate (including concrete sand) 2/	3,270	26,100	W	W	W	W	--	--
Concrete products (blocks, bricks, pipe, decorative, etc.)	89	1,050	--	--	--	--	--	--
Asphaltic concrete aggregates and and other bituminous mixtures	W	W	W	W	434	2,760	--	--
Road base and coverings 3/	5,190	36,900	524	2,380	1,320	4,790	--	--
Fill	5,190	19,000	112	473	31	103	1	1
Snow and ice control	W	W	W	W	98	386	--	--
Other miscellaneous uses 4/	2,600	19,000	415	2,380	79	495	--	--
Unspecified: 5/								
Reported	8,940	42,600	730	4,690	2,110	7,040	--	--
Estimated	7,800	38,000	2,400	11,000	440	2,100	--	--
Total	33,100	183,000	4,170	20,600	4,520	17,700	1	1

W Withheld to avoid disclosing company proprietary data; included with "Other miscellaneous uses." -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

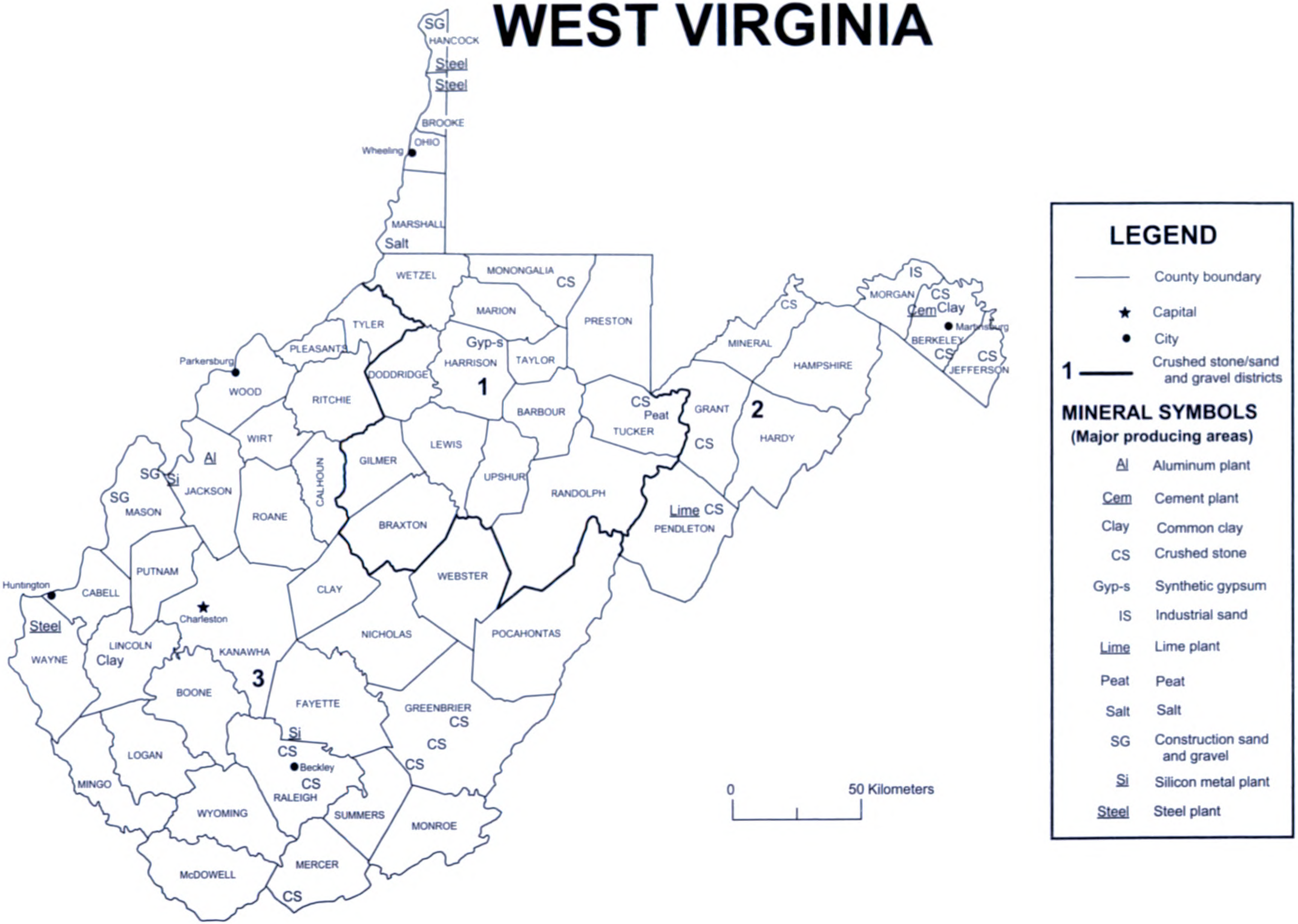
2/ Includes plaster and gunite sands.

3/ Includes road and other stabilization (cement).

4/ Includes filtration and railroad ballast.

5/ Reported and estimated production without a breakdown by end use.

WEST VIRGINIA



Source: West Virginia Geological and Economic Survey/U.S. Geological Survey (2001)

THE MINERAL INDUSTRY OF WEST VIRGINIA

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the West Virginia Geological and Economic Survey for collecting information on all nonfuel minerals.

In 2001, the estimated value[1] of nonfuel mineral production for West Virginia was $185 million, based upon preliminary U.S. Geological Survey (USGS) data. This was a 7.5% increase from that of 2000[2] and followed a marginal increase from 1999 to 2000. In 2001, crushed stone continued to be West Virginia's leading nonfuel mineral by value, representing approximately 35% of the State's total nonfuel mineral production value. Cement (portland and masonry), industrial sand and gravel, lime, and salt, in descending order of value, followed. These five mineral commodities accounted for nearly 90% of the State's same total value.

Crushed stone followed by cement led West Virginia's increase in nonfuel mineral value in 2001, rising more than $12 million and nearly $5 million, respectively. All other mineral commodities decreased by about $1 million or less or were unchanged. In 2000, increases of nearly $6 million in crushed dolomite, $2.5 million in industrial sand and gravel, plus smaller increases in construction sand and gravel, lime, and dimension sandstone (descending order of change) balanced out the decreases that occurred in crushed stone, down $3.7 million, cement, down more than $3 million, plus smaller drops in salt and common clay, resulting in the net increase of the year (table 1).

Based upon USGS estimates of the quantities of minerals produced in the 50 States in 2001, West Virginia decreased to 10th from 9th in the production of salt; the State also produced significant quantities of crushed stone, cement, and industrial sand and gravel (descending order of value). West Virginia mines produced only industrial minerals and coal; no metals were mined in the State. Primary aluminum and raw steel were produced in West Virginia, but both metals were processed from materials acquired from foreign and other domestic sources. In 2001, West Virginia, for the second consecutive year, was 10th in the Nation in the production of primary aluminum.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN WEST VIRGINIA 1/ 2/

(Thousand metric tons and thousand dollars)

	1999		2000		2001 p/	
Mineral	Quantity	Value	Quantity	Value	Quantity	Value
Clays, common	336	813	199	560	199	560
Gemstones	NA	1	NA	1	NA	1
Sand and gravel, construction	1,850	9,030	1,980	9,800	1,780	8,930
Stone, crushed 3/	12,500 r/	56,500 r/	12,100	52,800	14,500	65,400
Combined values of cement, lime, peat, salt, sand and gravel (industrial), stone (crushed dolomite and dimension sandstone)	XX	104,000	XX	109,000	XX	110,000
Total	XX	171,000	XX	172,000	XX	185,000

p/ Preliminary. r/ Revised. NA Not available. XX Not applicable.

1/ Production as measured by mine shipments or marketable production (including consumption by producers).

2/ Data are rounded to no more than three significant digits; may not add to totals shown.

3/ Excludes certain stones; kind and value included with "Combined values" data.

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[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2001 USGS mineral production data published in this chapter are preliminary estimates as of August 2002 and are expected to change. For some mineral commodities, such as construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Specialist contact information may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals/contacts/comdir.html; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2] Values, percentage calculations, and rankings for 2000 may vary from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also change.

TABLE 2
WEST VIRGINIA: CRUSHED STONE SOLD OR USED BY PRODUCERS, BY KIND 1/

	1999				2000			
Kind	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone	31 r	11,400 r/	$51,500 r/	$4.50 r/	29	10,900	$47,000	$4.33
Dolomite	1	W	W	W	2	W	W	W
Sandstone	10	1,020	4,990	4.92	9	1,210	5,810	4.79
Total or average	XX	12,500 r/	56,500 r/	4.54 r/	XX	12,100	52,800	4.38

r/ Revised. W Withheld from total to avoid disclosing company proprietary data. XX Not applicable.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 3
WEST VIRGINIA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+1 1/2 inch):			
Macadam	77	$383	$4.97
Riprap and jetty stone	61	450	7.38
Filter stone	W	W	9.86
Other coarse aggregate	200	799	4.00
Coarse aggregate, graded:			
Concrete aggregate, coarse	147	682	4.64
Bituminous aggregate, coarse	W	W	4.49
Bituminous surface-treatment aggregate	W	W	6.67
Other graded coarse aggregate	734	2,920	3.98
Fine aggregate (-3/8 inch):			
Stone sand, concrete	W	W	8.80
Stone sand, bituminous mix or seal	W	W	6.67
Screening, undesignated	W	W	4.65
Other fine aggregate	437	1,940	4.44
Coarse and fine aggregates:			
Graded road base or subbase	347	1,730	4.97
Unpaved road surfacing	241	1,300	5.37
Crusher run or fill or waste	108	396	3.67
Other coarse and fine aggregate	113	406	3.59
Other construction materials	148	909	6.14
Agricultural, agricultural limestone	(3/)	(3/)	11.67
Chemical and metallurgical, cement manufacture	(3/)	(3/)	3.42
Special, mine dusting or acid water treatment	(3/)	(3/)	27.27
Unspecified: 4/			
Reported	6,960	30,700	4.42
Estimated	1,300	5,100	4.02
Total or average	12,100	52,800	4.38

W Withheld to avoid disclosing company proprietary data; included with "Other."

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Includes limestone and sandstone; excludes dolomite from State total to avoid disclosing company proprietary data.

3/ Withheld to avoid disclosing company proprietary data; included in "Total."

4/ Reported and estimated production without a breakdown by end use.

TABLE 4
WEST VIRGINIA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1 1/2 inch) 2/	W	W	98	488	W	W
Coarse aggregate, graded 3/	455	1,820	W	W	W	W
Fine aggregate (-3/8 inch) 4/	327	1,510	W	W	W	W
Coarse and fine aggregate 5/	W	W	W	W	451	1,990
Other construction materials	26	437	--	--	122	472
Agricultural 6/	--	--	W	W	--	--
Chemical and metallurgical 7/	--	--	W	W	--	--
Special 8/	W	W	--	--	--	--
Unspecified: 9/						
Reported	4,000	17,600	829	3,650	2,130	9,450
Estimated	270	960	430	1,900	550	2,200
Total	5,430	24,900	2,990	12,100	3,640	15,900

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes filter stone, macadam, riprap and jetty stone, and other coarse aggregate.

3/ Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), and other graded coarse aggregate.

4/ Includes screening (undesignated), stone sand (bituminous mix or seal), stone sand (concrete), and other fine aggregate.

5/ Includes crusher run (select material or fill), graded road base or subbase, unpaved road surfacing, and other coarse and fine aggregate.

6/ Includes agricultural limestone.

7/ Includes cement manufacture.

8/ Includes mine dusting or acid water treatment.

9/ Reported and estimated production without a breakdown by end use.

TABLE 5
WEST VIRGINIA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY MAJOR USE CATEGORY 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate and concrete products	W	W	$4.40
Road stabilization (lime)	W	W	3.50
Fill	W	W	4.48
Other miscellaneous uses	232	$759	3.27
Unspecified: 3/			
Reported	1,690	8,550	5.06
Estimated	64	240	3.67
Total or average	1,980	9,800	4.94

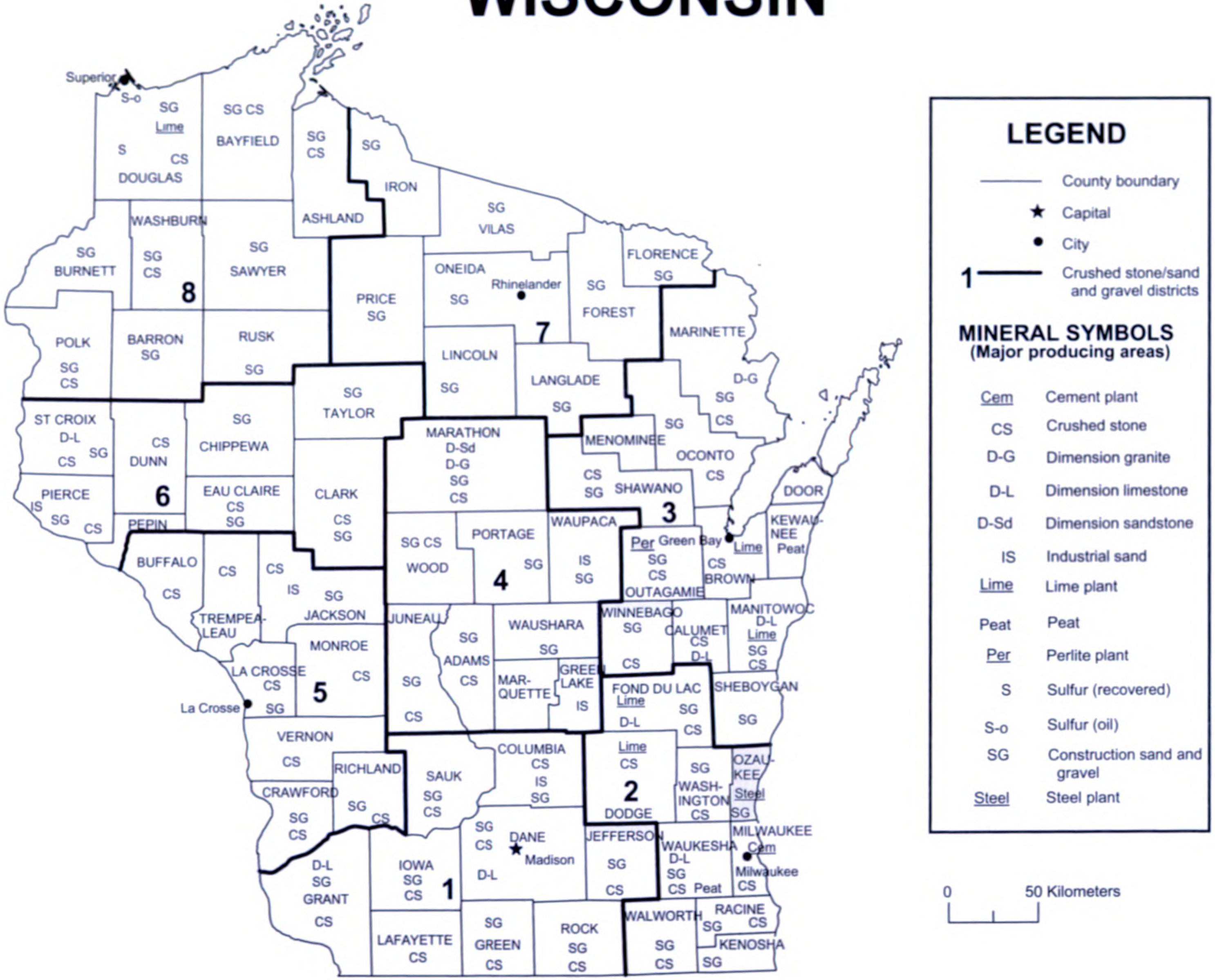
W Withheld to avoid disclosing company proprietary data; included with "Other miscellaneous uses."

1/ To avoid disclosing company proprietary data, no district tables were produced for 2000.

2/ Data are rounded to no more than three significant digits; may not add to totals shown.

3/ Reported and estimated production without a breakdown by end use.

WISCONSIN



Source: Wisconsin Geological and Natural History Survey/U.S. Geological Survey (2001)

THE MINERAL INDUSTRY OF WISCONSIN

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Wisconsin Geological and Natural History Survey for collecting information on all nonfuel minerals.

In 2001, the estimated value[1] of nonfuel mineral production for Wisconsin was $368 million, based upon preliminary U.S. Geological Survey (USGS) data. This was a marginal decrease from that of 2000[2] and followed a nearly 8% increase in 2000 from that of 1999. The State was 32d in rank among the 50 States in total nonfuel mineral production value, of which Wisconsin accounted for almost 1% of the U.S. total.

Construction sand and gravel and crushed stone were, by value, Wisconsin's leading nonfuel minerals in 2001, each accounting for nearly 39% of the State's total nonfuel raw mineral production value. These were followed by lime, industrial sand and gravel, and dimension stone, about 10%, 9%, and 3%, respectively, of the same value (table 1). Because data for peat and silica stone have been withheld to protect company proprietary data, the actual total values for 1999-2001 are higher than those reported in table 1.

In 2000, increases in the production and values of construction sand and gravel (up $22 million), industrial sand and gravel (up $4.2 million), and crushed stone (up $2 million) accounted for all the State's increase. While dimension stone production increased, its value was down by $1.7 million. Also slightly down for the year were the production and values of peat and silica stone.

Based upon USGS estimates of the quantities of minerals produced in the 50 States during 2001, Wisconsin remained third in dimension stone, fourth in industrial sand and gravel, and eighth in construction sand and gravel. Additionally, the State was a significant producer of crushed stone and lime.

The following narrative information was provided by the Wisconsin Geological and Natural History Survey (WGNHS).[3] Nicolet Minerals Co. (now owned by BHP Billiton Ltd.) continued to prepare information for its proposed Nicolet Mine, in response to comments made by the Wisconsin Department of Natural Resources (WDNR) on selected parts of the completed Environmental Impact Report (EIR). The underground mining project under proposal was for the development of the 50-million-metric-ton, zinc-copper massive-sulfide ore body known as the Crandon deposit. Beginning in the latter part of 2000 and throughout 2001, the review of the EIR and the various permit applications and requests for license approvals centered on the continued evaluation of the output of complex computer models that describe the projected impact of the proposed mine on ground water resources in the immediate Crandon area. At issue were (1) the projection of the amount of ground water inflow into the underground mine workings, (2) the resulting effect such water volumes may have on water-treatment strategies, as well as (3) the effects on the ground water base flow into surrounding lakes and streams. In addition, the ground water modeling effort addressed such issues as impacts on ground water quality because of mine reflooding. The draft Environmental Impact Statement, prepared by the WDNR, was expected to be ready for public review and comment during calendar year 2003.

For the third year in a row, no exploratory drill holes were initiated or completed in Wisconsin, and there was no substantive mineral leasing activity. The WGNHS attributed the lack of interest in exploration drilling and mineral leasing, in part, to industry concern with the ongoing review of the Nicolet Mine project and the length of time involved in such review under Wisconsin's mining regulations.

Legislation and Government Programs

Legislative activity in 2001 centered on two proposals: a proposal to ban the use of cyanide compounds in metallic mining in Wisconsin, and a proposal featuring the modification of certain details of the regulatory requirements related to mining waste and ground water management issues. Neither of the proposals received sufficient support for passage out of the State Legislature, although both were the focus of significant public discussion and media attention.

Mine Reclamation

The active phase of reclamation of the Flambeau Mine near Ladysmith, WI, was formally completed in 2001. Following the cessation of mining of high-grade copper-gold ore in 1997, the 13-hectare (32-acre) open pit mine was filled, the site was reshaped and revegetated, and 3 hectares (8 acres) of wetlands were restored. With the agreement of the Wisconsin DNR, the former mine site enters a 4-year period of less active maintenance, continued environmental monitoring, and ongoing evaluation of the quality of the reclamation program in terms of the requirements identified in the company's mine permit. The $12 million reclamation bond is expected to remain in place for several more years while the site is evaluated and monitored.

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[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2001 USGS mineral production data published in this chapter are preliminary estimates as of August 2002 and are expected to change. For some mineral commodities, such as construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Specialist contact information may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals/contacts/comdir.html; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals/.

[2] Values, percentage calculations, and rankings for 2000 may differ from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also change.

[3] Thomas J. Evans, Geologist, authored the text of the State mineral industry information provided by the Wisconsin Geological and Natural History Survey.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN WISCONSIN 1/ 2/

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral	1999		2000		2001 p/	
	Quantity	Value	Quantity	Value	Quantity	Value
Gemstones	NA	6	NA	6	NA	6
Lime	618	37,000	619	37,000	610	37,100
Peat	W	(3/)	W	(3/)	W	(3/)
Sand and gravel:						
Construction	35,700	128,000	39,600	150,000	37,300	143,000
Industrial	1,730	32,000	1,790	36,200	1,800	32,600
Silica stone 4/ metric tons	W	(3/)	W	(3/)	W	(3/)
Stone:						
Crushed	33,800 r/	135,000 r/	33,700	137,000	34,000	143,000
Dimension metric tons	85,500	13,400	93,100	11,700	93,000	12,000
Total	XX	345,000 r/	XX	372,000	XX	368,000

p/ Preliminary. r/ Revised. NA Not available. W Withheld to avoid disclosing company proprietary data. XX Not applicable.

1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/ Data are rounded to no more than three significant digits; may not add to totals shown.

3/ Value excluded to avoid disclosing company proprietary data.

4/ Grindstones, pulpstone, and sharpening stones; excludes mill liners and grinding pebbles.

TABLE 2
WISCONSIN: CRUSHED STONE SOLD OR USED BY PRODUCERS BY KIND 1/

Kind	1999				2000			
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone 2/	157 r/	26,200 r/	$107,000 r/	$4.07 r/	151	27,000	$111,000	$4.11
Dolomite	10 r/	2,340 r/	8,980 r/	3.84 r/	10	1,780	7,300	4.11
Granite	7	1,260	5,150	4.08	4	1,800	6,800	3.78
Sandstone and quartzite	4	2,170	7,050	3.25	5	1,590	6,000	3.79
Traprock	4	1,780	6,690	3.76	4	1,510	5,980	3.95
Total or average	XX	33,800 r/	135,000 r/	3.98	XX	33,700	137,000	4.07

r/ Revised. XX Not applicable.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes limestone-dolomite reported with no distinction between the two.

TABLE 3
WISCONSIN: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+1 1/2 inch):			
Macadam	W	W	$4.65
Riprap and jetty stone	86	$525	6.10
Filter stone	174	776	4.46
Other coarse aggregate	785	3,670	4.68
Coarse aggregate, graded:			
Concrete aggregate, coarse	1,970	9,140	4.64
Bituminous aggregate, coarse	326	1,760	5.40
Bituminous surface-treatment aggregate	209	1,200	5.73
Railroad ballast	W	W	4.50
Other graded coarse aggregate	10	43	4.30
Fine aggregate (-3/8 inch):			
Stone sand, concrete	(3/)	(3/)	3.47
Stone sand, bituminous mix or seal	(3/)	(3/)	4.96
Screening, undesignated	411	1,620	3.93
Coarse and fine aggregates:			
Graded road base or subbase	5,470	21,500	3.94
Unpaved road surfacing	177	826	4.67
Crusher run or fill or waste	795	3,070	3.86
Roofing granules	1,180	4,510	3.83
Other coarse and fine aggregates	1,170	6,220	5.33
Other construction materials	116	506	4.36
Agricultural:			
Agricultural limestone	(3/)	(3/)	8.70
Other agricultural uses	(3/)	(3/)	3.71
Chemical and metallurgical, lime manufacture	(3/)	(3/)	4.36
Unspecified: 4/			
Reported	7,200	27,800	3.86
Estimated	13,000	51,000	3.86
Total or average	33,700	137,000	4.07

W Withheld to avoid disclosing company proprietary data; included with "Other."

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes dolomite, granite, limestone, limestone-dolomite, sandstone and quartzite, and traprock.

3/ Withheld to avoid disclosing company proprietary data; included in "Total."

4/ Reported and estimated production without a breakdown by end use.

TABLE 4
WISCONSIN: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE AND DISTRICT 1/ 2/

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3		District 4	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Construction:								
Coarse aggregate (+1 1/2 inch) 3/	30	162	W	W	203	885	W	W
Coarse aggregate, graded 4/	1,240	5,110	W	W	392	1,740	W	W
Fine aggregate (-3/8 inch) 5/	50	185	W	W	230	807	W	W
Coarse and fine aggregate 6/	3,000	11,200	2,200	9,230	1,270	6,470	W	W
Other construction materials	2	24	--	--	114	482	--	--
Agricultural 7/	95	468	W	W	W	W	--	--
Chemical and metallurgical 8/	--	--	--	--	W	W	--	--
Unspecified: 9/								
Reported	588	2,250	--	--	--	--	406	1,570
Estimated	2,000	7,600	3,400	13,000	4,900	19,000	1,000	3,900
Total	6,990	27,000	7,360	32,200	7,340	30,700	2,870	10,900

Use	District 5		District 6		District 8	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1 1/2 inch) 3/	W	W	--	--	W	W
Coarse aggregate, graded 4/	W	W	--	--	W	W
Fine aggregate (-3/8 inch) 5/	W	W	--	--	--	--
Coarse and fine aggregate 6/	W	W	W	W	W	W
Other construction materials	--	--	--	--	--	--
Agricultural 7/	W	W	W	W	W	W
Chemical and metallurgical 8/	--	--	--	--	--	--
Unspecified: 9/						
Reported	5,110	19,700	1,100	4,230	--	--
Estimated	530	2,000	83	320	1,100	4,400
Total	6,600	26,300	1,220	4,840	1,320	5,310

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

1/ No production reported in District 7.

2/ Data are rounded to no more than three significant digits; may not add to totals shown.

3/ Includes filter stone, macadam, riprap and jetty stone, and other coarse aggregate.

4/ Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), railroad ballast, and other graded coarse aggregate.

5/ Includes screening (undesignated), stone sand (bituminous mix or seal), and stone sand (concrete).

6/ Includes crusher run (select material or fill), graded road base or subbase, roofing granules, unpaved road surfacing, and other coarse and fine aggregates.

7/ Includes agricultural limestone and other agricultural uses.

8/ Includes lime manufacture.

9/ Reported and estimated production without a breakdown by end use.

TABLE 5
WISCONSIN: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	8,060	$37,300	$4.63
Plaster and gunite sands	15	80	5.33
Concrete products (blocks, bricks, pipe, decorative, etc.)	230	846	3.68
Asphaltic concrete aggregates and other bituminous mixtures	2,360	8,620	3.66
Road base and coverings	6,820	23,400	3.43
Road stabilization (cement and lime)	958	4,790	5.00
Fill	1,830	4,640	2.53
Snow and ice control	158	538	3.41
Roofing granules	11	66	6.00
Filtration	192	1,200	6.26
Other miscellaneous uses	57	649	11.39
Unspecified: 2/			
Reported	9,990	36,500	3.66
Estimated	8,900	31,000	3.48
Total or average	39,600	150,000	3.78

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Reported and estimated production without a breakdown by end use.

TABLE 6
WISCONSIN: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate (including concrete sand)	647	3,120	2,460	9,760	1,430	5,250
Concrete products (blocks, bricks, pipe, decorative, etc.) 2/	105	395	115	443	W	W
Asphaltic concrete aggregates and other bituminous mixtures	406	1,360	789	3,260	170	399
Road base and coverings 3/	24	93	2,760	11,500	1,190	3,720
Fill	110	443	849	2,370	393	948
Snow and ice control	26	71	15	99	37	149
Roofing granules	11	66	--	--	--	--
Other miscellaneous uses 4/	152	926	34	171	42	142
Unspecified: 5/						
Reported	1,070	4,130	6,600	24,900	42	146
Estimated	1,400	4,800	2,200	7,700	1,200	4,000
Total	3,950	15,400	15,800	60,200	4,500	14,700

	District 4		District 5 and 6		District 7	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate (including concrete sand)	W	W	2,110	12,300	237	912
Concrete products (blocks, bricks, pipe, decorative, etc.) 2/	W	W	1	4	--	--
Asphaltic concrete aggregates and other bituminous mixtures	W	W	W	W	91	276
Road base and coverings 3/	W	W	902	2,810	339	846
Fill	73	303	107	174	125	198
Snow and ice control	W	W	W	W	W	W
Roofing granules	W	W	--	--	--	--
Other miscellaneous uses 4/	502	2,590	178	440	25	151
Unspecified: 5/						
Reported	1,600	5,200	570	1,980	53	103
Estimated	2,300	8,400	490	1,900	520	1,800
Total	4,490	16,500	4,360	19,500	1,390	4,250

	District 8		Unspecified districts	
	Quantity	Value	Quantity	Value
Concrete aggregate (including concrete sand)	479	2,100	483	2,670
Concrete products (blocks, bricks, pipe, decorative, etc.) 2/	--	--	--	--
Asphaltic concrete aggregates and other bituminous mixtures	247	576	302	1,750
Road base and coverings 3/	1,170	2,790	1,350	6,340
Fill	43	57	131	144
Snow and ice control	14	30	--	--
Roofing granules	--	--	--	--
Other miscellaneous uses 4/	--	--	--	--
Unspecified: 5/				
Reported	53	106	--	--
Estimated	840	2,600	--	--
Total	2,850	8,210	2,270	10,900

W Withheld to avoid disclosing company proprietary data; included with "Other miscellaneous uses." -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

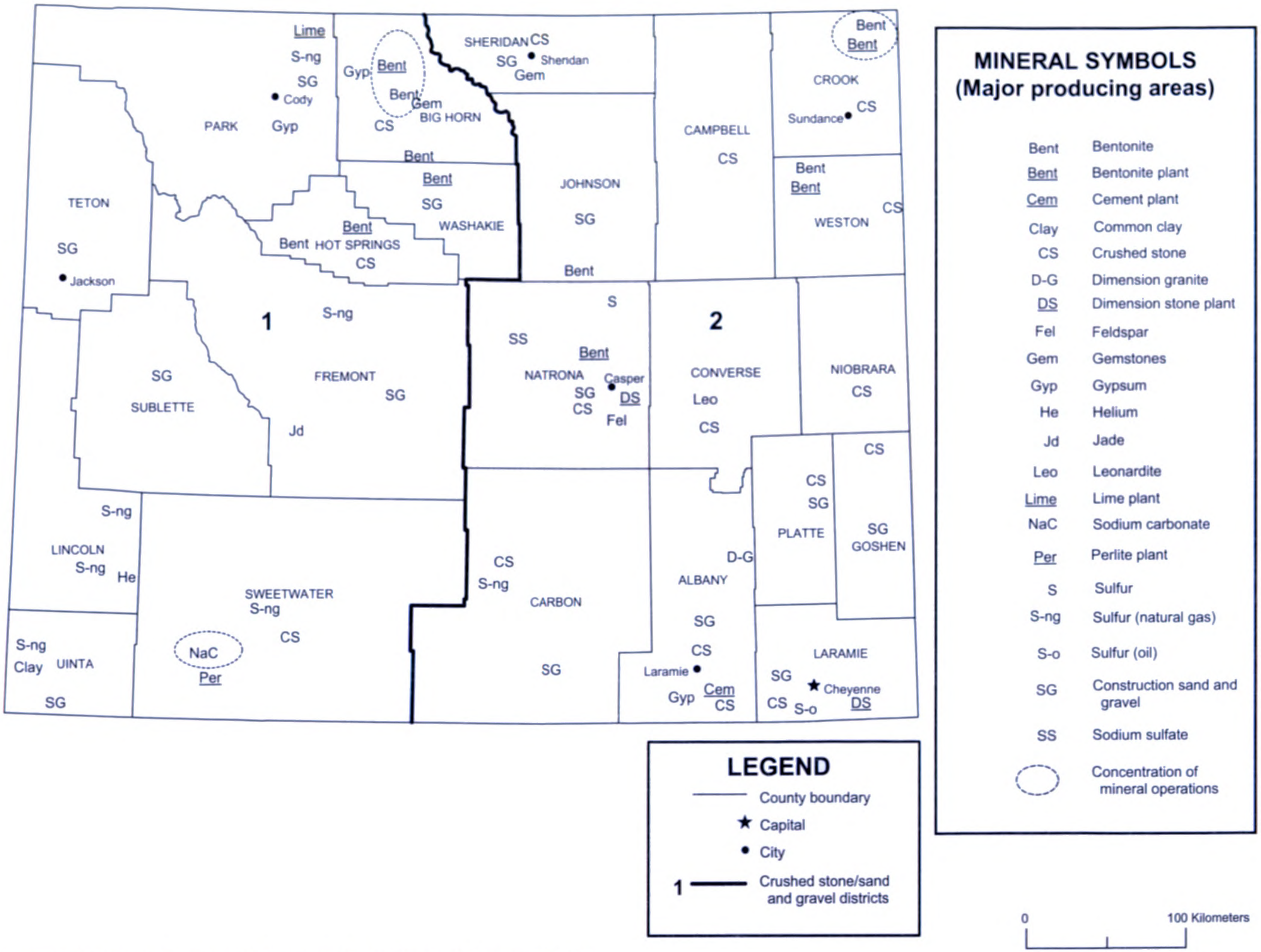
2/ Includes plaster and gunite sands.

3/ Includes road and other stabilization (cement and lime).

4/ Includes filtration.

5/ Reported and estimated production without a breakdown by end use.

WYOMING



MINERAL SYMBOLS
(Major producing areas)

Bent	Bentonite
Bent	Bentonite plant
Cem	Cement plant
Clay	Common clay
CS	Crushed stone
D-G	Dimension granite
DS	Dimension stone plant
Fel	Feldspar
Gem	Gemstones
Gyp	Gypsum
He	Helium
Jd	Jade
Leo	Leonardite
Lime	Lime plant
NaC	Sodium carbonate
Per	Perlite plant
S	Sulfur
S-ng	Sulfur (natural gas)
S-o	Sulfur (oil)
SG	Construction sand and gravel
SS	Sodium sulfate
◯	Concentration of mineral operations

Source: Wyoming State Geological Survey/U.S. Geological Survey (2001)

THE MINERAL INDUSTRY OF WYOMING

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Wyoming State Geological Survey for collecting information on all nonfuel minerals.

In 2001 the estimated value[1] of nonfuel mineral production for Wyoming was $986 million, based upon preliminary U.S. Geological Survey (USGS) data. This was about a 1% increase from that of 2000[2] and followed a 2.2% decrease from 1999 to 2000. The State, for the second consecutive year, ranked 15th among the 50 States in total nonfuel mineral production value, of which Wyoming accounted for more than 2.5% of the U.S. total.

Wyoming's leading nonfuel mineral, by value, was soda ash, followed by bentonite, Grade-A helium, and portland cement. The four combined accounted for about 94% of the State's total raw nonfuel mineral production value. In 2001, the State's increase in value was mostly attributable to the rising values of bentonite, Grade-A helium, and soda ash, moderated somewhat by decreases in the values of portland cement and crushed stone. In 2000, decreases of more than $25 million in soda ash, $20 million in bentonite, and about $6 million in Grade-A helium were, in part, offset by increases of about $23 million in portland cement and $6.6 million in construction sand and gravel. All other nonfuel minerals had relatively small to no changes in production and value and had little effect on the overall net result in value (table 1).

Based upon USGS estimates of the quantities of minerals produced in the 50 States during 2001, Wyoming remained first in soda ash and bentonite and second in Grade-A helium. Soda ash (sodium carbonate) is an inorganic chemical used extensively in the manufacture of glass, paper, soap and detergents, and textiles, and as sodium bicarbonate in food products. The United States is the world's largest producer of soda ash. Wyoming, one of only three soda ash-producing States, is home to the world's largest known natural deposit of trona. Trona is the principal ore from which soda ash is produced. California and Colorado produce significantly smaller quantities of natural soda ash. During the past several years, Wyoming has had considerable exploration activity for metals but has not had significant metal production since iron ore mining ceased in April 1984.

The Wyoming State Geological Survey (WSGS) provided the following narrative information.[3] Production data in the text that follows are those reported by the WSGS and are based on the agency's own surveys and estimates. They may differ from some production figures reported to the USGS. Bentonite production increased to near record levels in Wyoming in 2001. There are currently 15 operating bentonite mills in Wyoming. Cat box litter continued to be the primary use for bentonite, followed by its use in foundry molds and taconite pelletizing.

Mountain Cement at Laramie produced more than 450,000 metric tons (t) of cement per year, up slightly from the previous year. The plant manufactured cement from limestone, gypsum, and siliceous shale, all quarried near the plant. The plant quarried gypsum and shale intermittently and stockpiled them on site.

More than 11 million metric tons (Mt) of construction aggregate was quarried in Wyoming in 2001, about a 10% increase from the previous year. The largest increase was in construction aggregate used to surface coal mine haul roads in the Powder River Basin. An increase in highway construction also contributed to the increase in aggregate quarrying. The Martin Marietta Materials Inc. quarry in granite gneiss west of Cheyenne continued to be the largest single aggregate quarry in Wyoming. Other aggregate production included sand and gravel (river rock), crushed limestone, crushed clinker (baked and fused shale), and crushed sandstone.

The production of cut and polished pieces of Wyoming Raven (black granite) and Mirage (gneiss) continued at Raven Quarries LLC quarry in northern Albany County. Raven leased the operation of its quarries to Gallegos Stone at the yearend. At yearend, five companies were in various stages of planning, acquiring leases, or permitting dimensional stone quarries and fabricating plants in Wyoming.

Several small fieldstone quarries continued in operation or opened in Wyoming in 2001. These supplied rock for landscaping, interior and exterior finishing, and similar uses. Most of this material was shipped to the Colorado Front Range and ski towns.

Decorative aggregate was produced in several localities in Wyoming in 2001. Like fieldstone, most of Wyoming's production was shipped to Colorado. Imerys Marble Co. is increasing production of the white marble aggregate from its Wheatland, WY, quarry and processing plant. About 90,000 t of white marble was quarried in 2001.

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[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

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[2] Values, percentage calculations, and rankings for 2000 may differ from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also change.

[3] Ray E. Harris, Staff Geologist—Industrial Minerals and Uranium, and W. Daniel Hausel, Senior Economic Geologist—Metals and Precious Stones, both of the Wyoming State Geological Survey, coauthored the text of the State mineral industry information provided by that agency.

Gypsum is mined at two localities in the Bighorn Basin, where it is used as the primary ingredient in wallboard, and south of Laramie for use as a retardant in cement. Gypsum production in Wyoming declined significantly in 2000 from 1999 because of a partial shutdown of the Celotex plant at Cody during its sale to BPB, Ltd., a British company. In 2001, the Cody operation was called BPB-Celotex. Production recovered in 2001 to reach a record 537,000 t.

Wyoming produces slightly less than 45,000 t of leonardite per year. Leonardite is a soft, earthy, medium-brown coallike substance associated with lignite. Black Hills Lignite, LLC produced this mineral product from one mine near Glenrock in Converse County. Leonardite is used in oil drilling muds, agricultural conditioners, wood stain, and other products. Leonardite production from Wyoming has been decreasing slightly during the past 2 years.

Basin Electric obtained limestone for emissions control at its Laramie River Station powerplant near Wheatland from Colorado Lien's Hartville Quarry. Lien also sold limestone to Holly Sugar for use in refining sugar beets in 2001. Limestone is mined near Laramie for cement. Lime is produced in Wyoming by Wyoming Lime Producers at Frannie from limestone quarried in Montana.

The production of soda ash and other sodium based products in Wyoming declined slightly in 2001 from the preceding year. More than 16.1 Mt of trona was mined in Wyoming in 2001, down from a high of 17.3 Mt in 1997. Wyoming's trona-based industry continues to face competition from China and the nahcolite facility in Colorado.

The Addwest Minerals, Inc. zeolite mine located west of Bitter Creek remained inactive in 2001. Addwest is determining product uses and markets for its clinoptilolite.

Diamond exploration in the Wyoming Craton was at a low level in 2001, even though the available data supports that the craton has been intruded by major swarms of mantle-derived intrusives and that the potential for the discovery of additional diamond deposits is considered high.

Results of mapping and sampling in the Iron Mountain district in the central Laramie Range of southeastern Wyoming by the WSGS showed an extensive field of kimberlite dikes, blows, and sills over a strike length of more than 8 kilometers. The geology is favorable for other undiscovered kimberlites within, north, and west of the mapped area.

The Leucite Hills near Rock Springs, WY, is the largest lamproite field in North America. Lamproites are considered potential diamond targets, although no diamonds have been found here; there has been very little sampling. The search for diamond-stability chromites in the lamproites led to the recovery of a few chrome spinels with geochemical signatures similar to diamond inclusion chromites. Thus future exploration was recommended to concentrate on the search for hidden olivine lamproites within the volcanic field. Another gem was identified by the WSGS when 13,000 carats of peridot and industrial olivine were recovered from two anthills.

The 8th International Kimberlite Conference will be held in Vancouver, British Columbia, Canada, in 2003. Part of that conference will include a 6-day field trip through a portion of the Wyoming Craton. The WSGS will assist in the logistics of the field trip. Information and updates on the conference are available on the Internet at URL http://www.venuewest.com/8IKC/.

Treasure hunters and prospectors continued to search for gold in Wyoming, but company activity remained at a minimum. Treasure hunters made several discoveries, but no statistics are kept on such finds. One reported finding more than 100 nuggets in the South Pass region of western Wyoming, and another reported that 399 nuggets were found in the Encampment district in southeastern Wyoming.

Company interest for gold was at one of its lowest points in two decades. Geologists with one Nevada gold company arranged for a field trip to the South Pass district with the WSGS. Following the trip, an offer was made to purchase the Carissa Mine at South Pass, but the company was unable to come to an agreement with the owner. Employees of a second Nevada-based gold company attended a public field trip and requested a followup field trip by the WSGS.

The only permitted gold mine in Wyoming, the Mary Ellen, operated by the Gyorvary Mining Co., continued to upgrade the mill at the mine site in 2001.

Platinum-group metals (PGM) exploration continued throughout 2001 in the Lake Owen, Mullen Creek, Centennial Ridge, Puzzler Hill, Wood Mountain, and other areas within the Medicine Bow National Forest and Sierra Madre Mountains. Exploration activity in southeastern Wyoming for PGM included stream sediment sampling, soil and rock sampling, and airborne geophysical surveys. At least six companies held mining claims and reported interest in the region. Some discoveries reported during 2001 include significant anomalous palladium and platinum zones over relatively thick zones with good strike lengths. It has been estimated that about 2000 claims have been filed in the Medicine Bow National Forest for PGM.

The WSGS continued compiling data for the Rattlesnake Hills 1:100,000 quadrangle in central Wyoming in 2001. This quadrangle covers a large portion of the Granite Mountains west of Casper.

In cooperation with the USGS under the STATEMAP component of the USGS National Cooperative Geologic Mapping Program, the WSGS received funding to map the geology of the Keystone 7.5-minute quadrangle in the Medicine Bow Mountains in southeastern Wyoming. This quadrangle encloses the Proterozoic age Keystone Quartz Diorite and the eastern portion of the Mullen Creek layered mafic complex.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN WYOMING 1/ 2/

(Thousand metric tons and thousand dollars)

Mineral	1999		2000		2001 p/	
	Quantity	Value	Quantity	Value	Quantity	Value
Clays, bentonite	3,370	146,000	3,080	126,000	3,160	131,000
Gemstones	NA	12	NA	12	NA	12
Sand and gravel, construction	4,410	17,200	6,340	23,800	6,510	24,800
Stone, crushed	6,970	27,600	6,250	26,100	5,000	21,500
Combined values of cement (portland), clays (common), gypsum (crude), helium (Grade-A), lime, soda ash	XX	814,000	XX	802,000	XX	809,000
Total	XX	1,000,000	XX	978,000	XX	986,000

p/ Preliminary. NA Not available. XX Not applicable.

1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/ Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 2
WYOMING: CRUSHED STONE SOLD OR USED BY PRODUCERS, BY KIND 1/

Kind	1999				2000			
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone 2/	8 r/	2,280 r/	$9,250 r/	$4.06 r/	8	2,130	$9,840	$4.63
Granite	2	W	W	W	2	W	W	W
Marble	1	W	W	W	1	W	W	W
Quartzite	1	W	W	W	--	--	--	--
Volcanic cinder and scoria	1	W	W	W	1	W	W	W
Miscellaneous stone	2	280	1,550	5.52	5	788	3,040	3.86
Total or average	XX	6,970	27,600	3.96	XX	6,250	26,100	4.18

r/ Revised. W Withheld to avoid disclosing company proprietary data; included in "Total." XX Not applicable. -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes limestone-dolomite reported with no distinction between the two.

TABLE 3
WYOMING: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+1 1/2 inch):			
Macadam	W	W	$10.25
Riprap and jetty stone	71	$575	8.10
Coarse aggregate, graded:			
Concrete aggregate, coarse	170	994	5.85
Bituminous aggregate, coarse	W	W	4.88
Bituminous surface-treatment aggregate	W	W	3.96
Railroad ballast	W	W	4.19
Fine aggregate (-3/8 inch):			
Stone sand, concrete	21	75	3.57
Stone sand, bituminous mix or seal	W	W	6.56
Screening, undesignated	W	W	3.39
Coarse and fine aggregates:			
Graded road base or subbase	1,230	4,890	3.97
Terrazzo and exposed aggregate	W	W	12.10
Other construction materials	55	198	3.60
Unspecified: 3/			
Reported	1,070	4,060	3.80
Estimated	240	880	3.65
Total or average	6,250	26,100	4.18

W Withheld to avoid disclosing company proprietary data; included in "Total."

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Includes granite, limestone, limestone-dolomite, marble, miscellaneous stone, and volcanic cinder and scoria.

3/ Reported and estimated production without a breakdown by end use.

TABLE 4
WYOMING: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

	Districts 1 and 2 2/		Unspecified districts	
Use	Quantity	Value	Quantity	Value
Construction:				
Coarse aggregate (+1 1/2 inch) 3/	W	W	--	--
Coarse aggregate, graded 4/	2,520	11,100	--	--
Fine aggregate (-3/8 inch) 5/	W	W	--	--
Coarse and fine aggregate 6/	W	W	--	--
Other construction materials	55	198	--	--
Unspecified: 7/				
Reported	60	231	1,010	3,830
Estimated	240	880	--	--
Total	5,240	22,300	1,010	3,830

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Districts 1 and 2 are combined to avoid disclosing company proprietary data.

3/ Includes macadam and riprap and jetty stone.

4/ Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), and railroad ballast.

5/ Includes screening (undesignated), stone sand (bituminous mix or seal), and stone sand (concrete).

6/ Includes graded road base or subbase, and terrazzo and exposed aggregate.

7/ Reported and estimated production without a breakdown by end use.

TABLE 5
WYOMING: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	629	$3,010	$4.79
Plaster and gunite sands	11	37	3.36
Concrete products (blocks, bricks, pipe, decorative, etc.)	10	44	4.40
Asphaltic concrete aggregates and other bituminous mixtures	694	4,690	6.76
Road base and coverings 2/	1,590	7,790	4.91
Fill	210	505	2.40
Railroad ballast	6	34	5.67
Other miscellaneous uses 3/	11	51	4.64
Unspecified: 4/			
Reported	2,450	4,850	1.98
Estimated	730	2,800	3.79
Total or average	6,340	23,800	3.75

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes road and other stabilization (cement and lime).

3/ Includes snow and ice control.

4/ Reported and estimated production without a breakdown by end use.

TABLE 6
WYOMING: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		Unspecified districts	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products 2/	311	1,450	338	1,650	--	--
Aspaltic concrete aggregates and road base materials 3/	1,360	7,740	923	4,750	--	--
Fill	50	195	160	310	--	--
Railroad ballast	--	--	6	34	--	--
Other miscellaneous uses 4/	8	35	3	16	--	--
Unspecified: 5/						
Reported	599	1,780	1,020	1,710	827	1,370
Estimated	190	700	540	2,100	--	--
Total	2,520	11,900	2,990	10,500	827	1,370

-- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes plaster and gunite sands.

3/ Includes road and other stabilization (cement and lime).

4/ Includes snow and ice control.

5/ Reported and estimated production without a breakdown by end use.

MAPS AND MINERAL SYMBOLS[1]

Abr	Abrasives
Ag	Silver
AgLime	Agricultural lime
Al	Aluminum plant
Ala	Alumina
Asb	Asbestos
Au	Gold
B	Borates
Ba	Barite
BC	Ball clay
Be	Beryllium
Bent	Bentonite
Br	Bromine
Bruce	Brucite
Bx	Bauxite
CaC	Calcium carbonate
Cd	Cadmium
Cem	Cement plant
CFA	Chrome ferroalloy plant
Clay	Common clay
CS	Crushed stone
Cu	Copper
D-D	Dimension dolomite
D-G	Dimension granite
D-L	Dimension limestone
D-M	Dimension marble
D-Q	Dimension quartzite
D-Sd	Dimension sandstone
D-Sl	Dimension slate
D-Sp	Dimension soapstone
Do	Dolomite
Dia	Diatomite
DS	Dimension stone
Em	Emery
F	Fluorspar
FA	Ferroalloys plant
FC	Fire clay
Fe	Iron
Fel	Feldspar
FePig	Iron oxide pigments
Fs	Ferrosilicon
Ful	Fuller's earth
Gar	Garnet
Ge	Germanium
Gem	Gemstones
Gil	Gilsonite
Gr	Graphite plant
GS	Greensand
Gyp	Gypsum
Gyp-s	Synthetic gypsum
He	Helium
Hg	Mercury plant
I	Iodine
IS	Industrial sand
ISG	Industrial sand and gravel
Jd	Jade
K	Potash
Ka	Kaolin
Ky	Kyanite
Leo	Leonardite
Li	Lithium carbonate
Li	Lithium plant
Lime	Lime plant
Mg	Magnesium
MgCp	Magnesium compounds
Mica	Mica
Mn	Manganese dioxide plant
Mo	Molybdenum
Mul	Synthetic mullite plant
Nabic	Sodium bicarbonate
NaC	Sodium carbonate
Nb	Columbium (niobium)
Nb/Ta	Columbium (niobium) and tantalum plant
Ni	Nickel
Nsal	Natural salines (CaCl)
O	Olivine
Opal	Precious opal
P	Phosphate rock
Pb	Lead
Peat	Peat
Per	Perlite
Pt-Pd	Platinum/palladium
Pum	Pumice and pumicite
Pyrp	Pyrophyllite
QC	Quartz crystal
RE	Rare earths
S	Sulfur
S-ng	Sulfur (natural gas)
S-o	Sulfur (oil)
SaCp	Saline compounds
Salt	Salt
Sb	Antimony
SG	Construction sand and gravel
Sh	Shale
Shell	Shell
Si	Silicon metal plant
Slag	Slag
SS	Sodium sulfate
Steel	Steel plant
Talc	Talc
Ti	Titanium minerals
TiMet	Titanium metal plant
TiPig	Titanium dioxide pigment plant
Trip	Tripoli
V	Vanadium
Vm	Vermiculite
Volc	Volcanic cinder
W	Tungsten
Wol	Wollastonite
Zeo	Zeolites
Zn	Zinc

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[1] The maps in this report are intended to show by mineral symbol the location of significant nonfuel mineral mining or processing operations within each State in 2001. (An underlined symbol indicates a plant.) The symbols are not intended to show the location of every mine, quarry, and operation. Because there are about 13,000 nonfuel mineral operations in the United States, publication space limitations preclude the inclusion of a clear and legible map indicating all active operations. The U.S. Geological Survey's National Atlas, however, provides such data on the Internet at URL http://www.nationalatlas.gov. In most cases, a mineral symbol represents production of a significant quantity of a mineral. A symbol can indicate the location of a major mineral mining or processing operation, the location of a concentration of mining operations for a specific mineral, or the location of significant operations within a county. In some cases, however, a symbol may indicate a small operation that is significant because the mineral is uncommon or unique within the State or the Nation. Where there is an extensive geographic area with a significant concentration of similar operations, a dashed line defines the area.

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